TECHNOLOGY DEPT.

Gas Journal

VOL. 290. 109th YEAR. LONDON, APRIL 3, 1957. No. ~~4823.~~ 4890 PRICE 1/6

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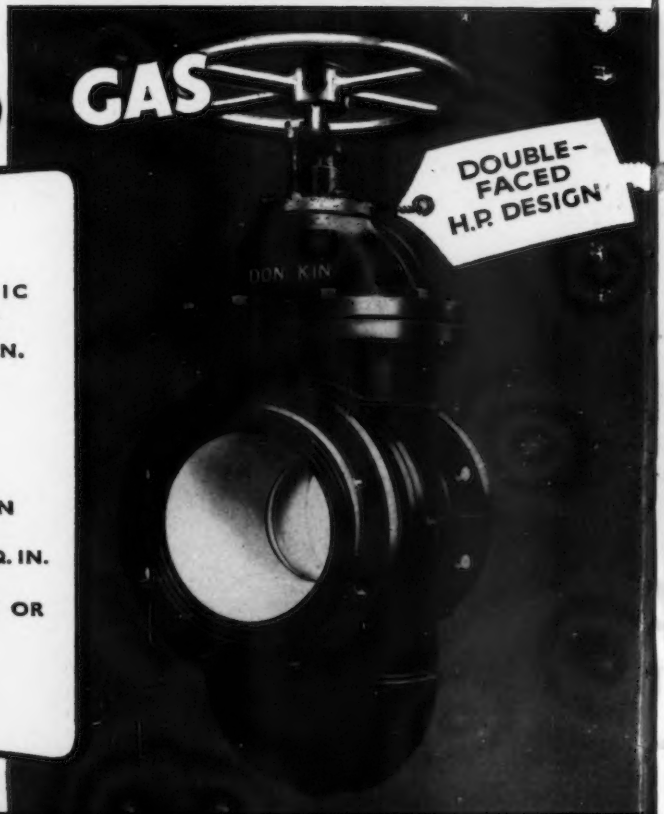

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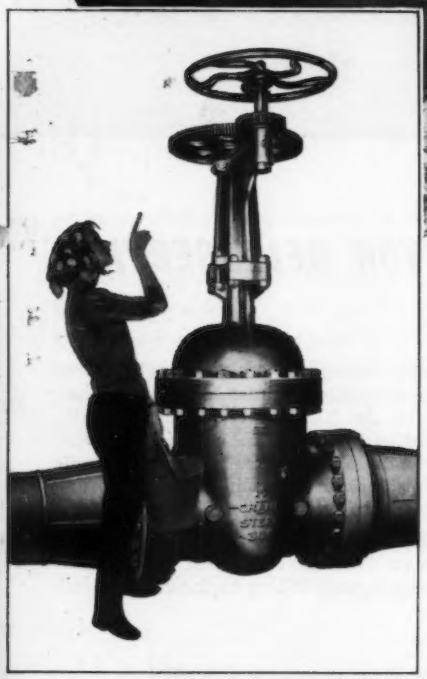

THE pigs, of course, couldn't care less, but the farmer's wife finds it amazing that CRANE giant valves help to keep them well fed. However at the Pfizer Organisation, a large chemical producing factory, there is a department specialising in preparations used in pig feeding. And here these valves are performing vital duties during the early processing stages. The industries which CRANE giant valves serve are varied and numerous . . . and the giant valve is only one among a wide variety of CRANE valves—ranging from $\frac{1}{8}$" to 24"—each with a tradition of reliable, efficient service. CRANE's reputation for reliability lies in their high standard of design, production and precision testing methods.

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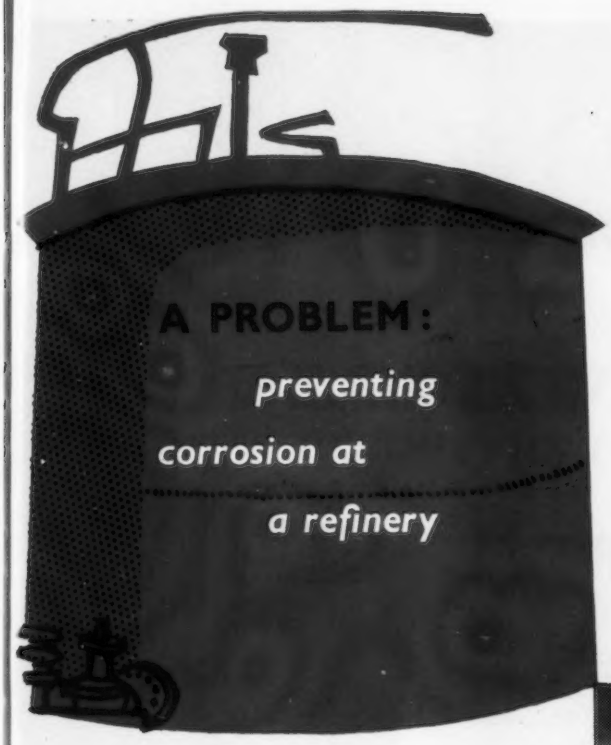

The modern oil refinery, with its attendant large-scale chemical production, raises many problems of protection against corrosion. To atmospheric corrosion are added the destructive effect of moisture, sulphuric acid, olefines, caustic and other materials.

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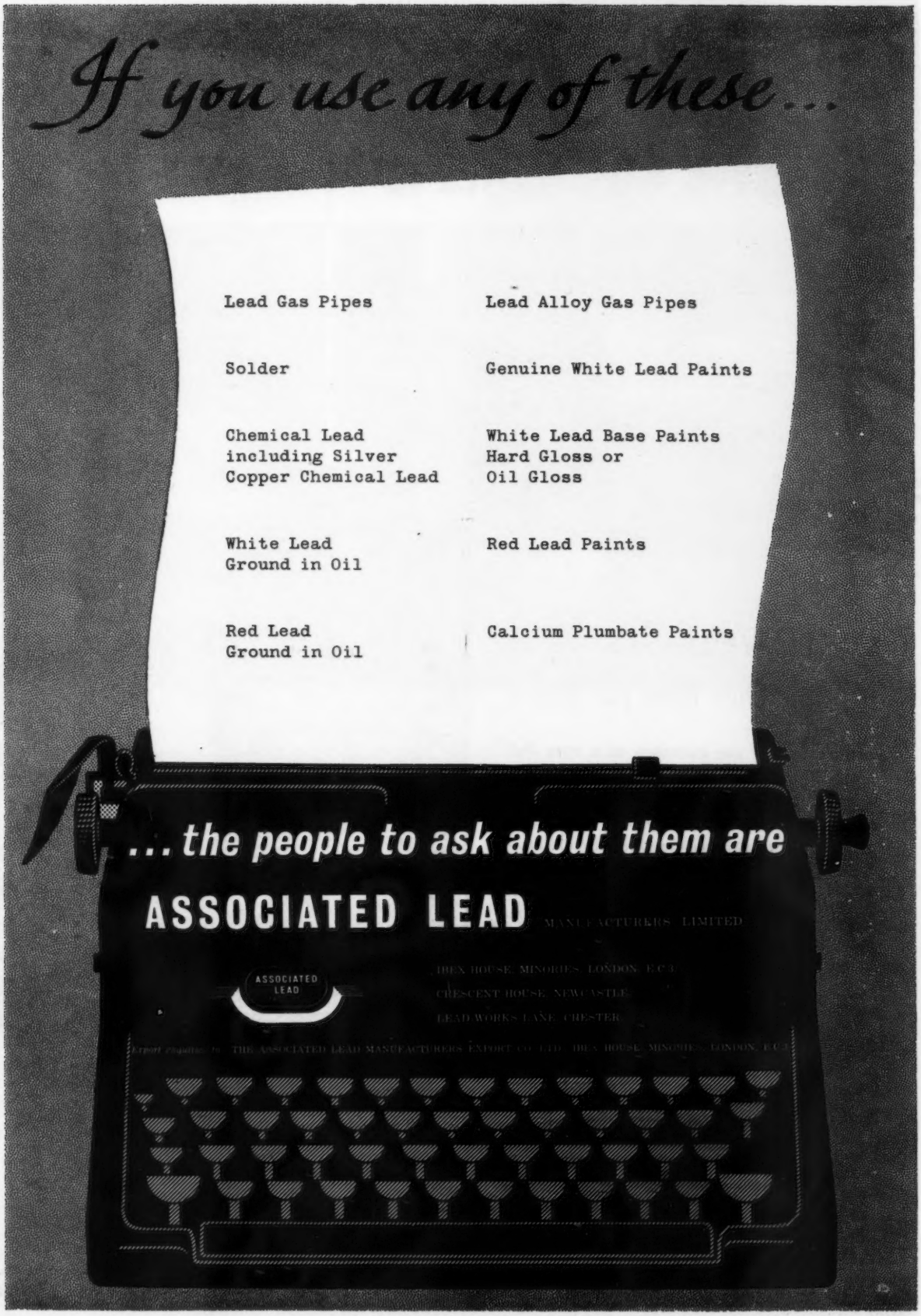
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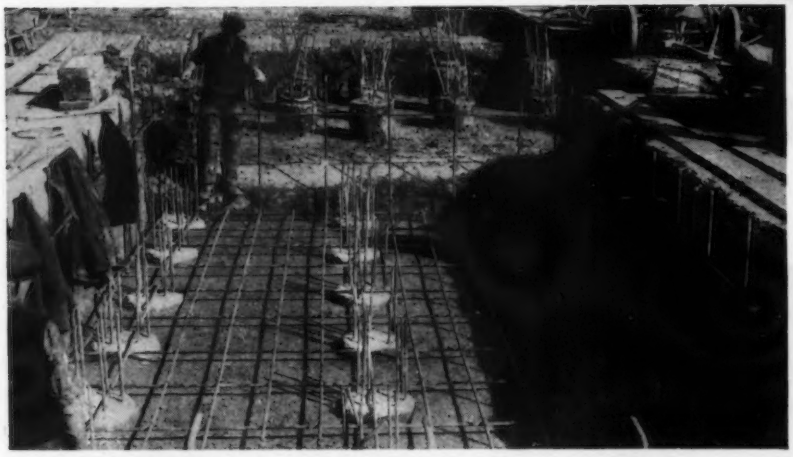

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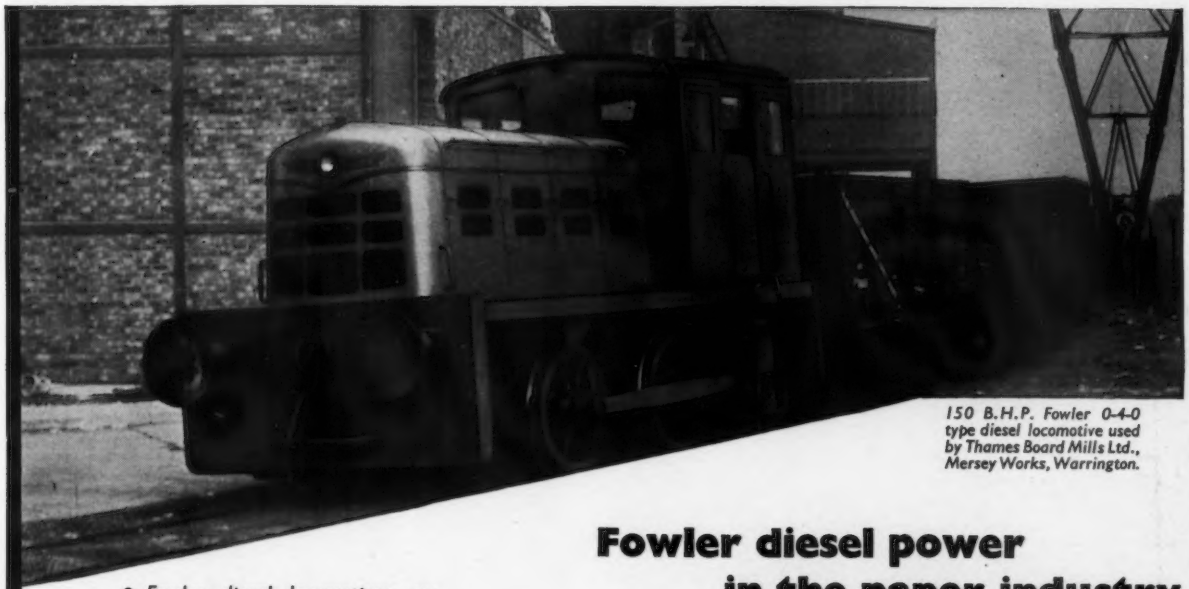

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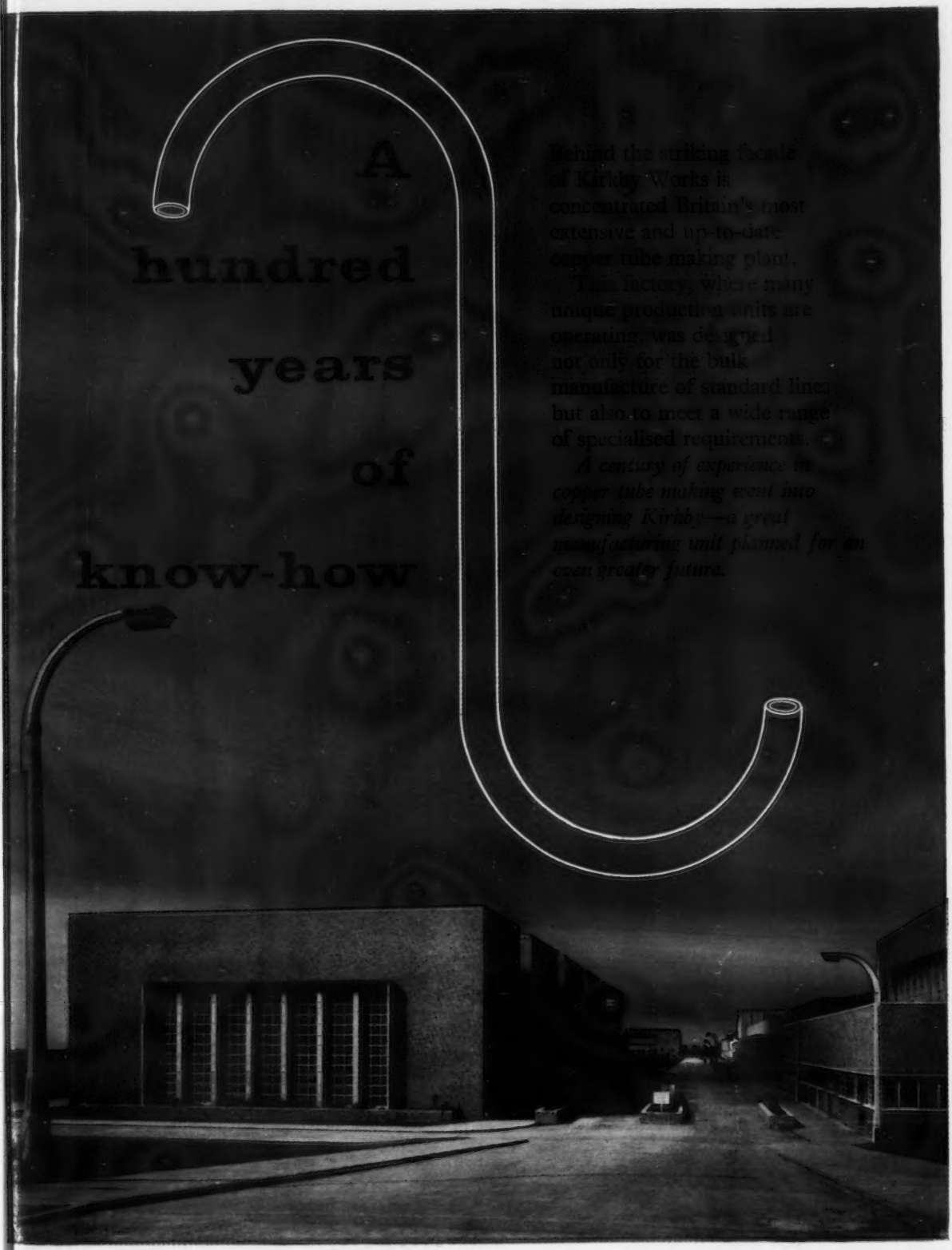

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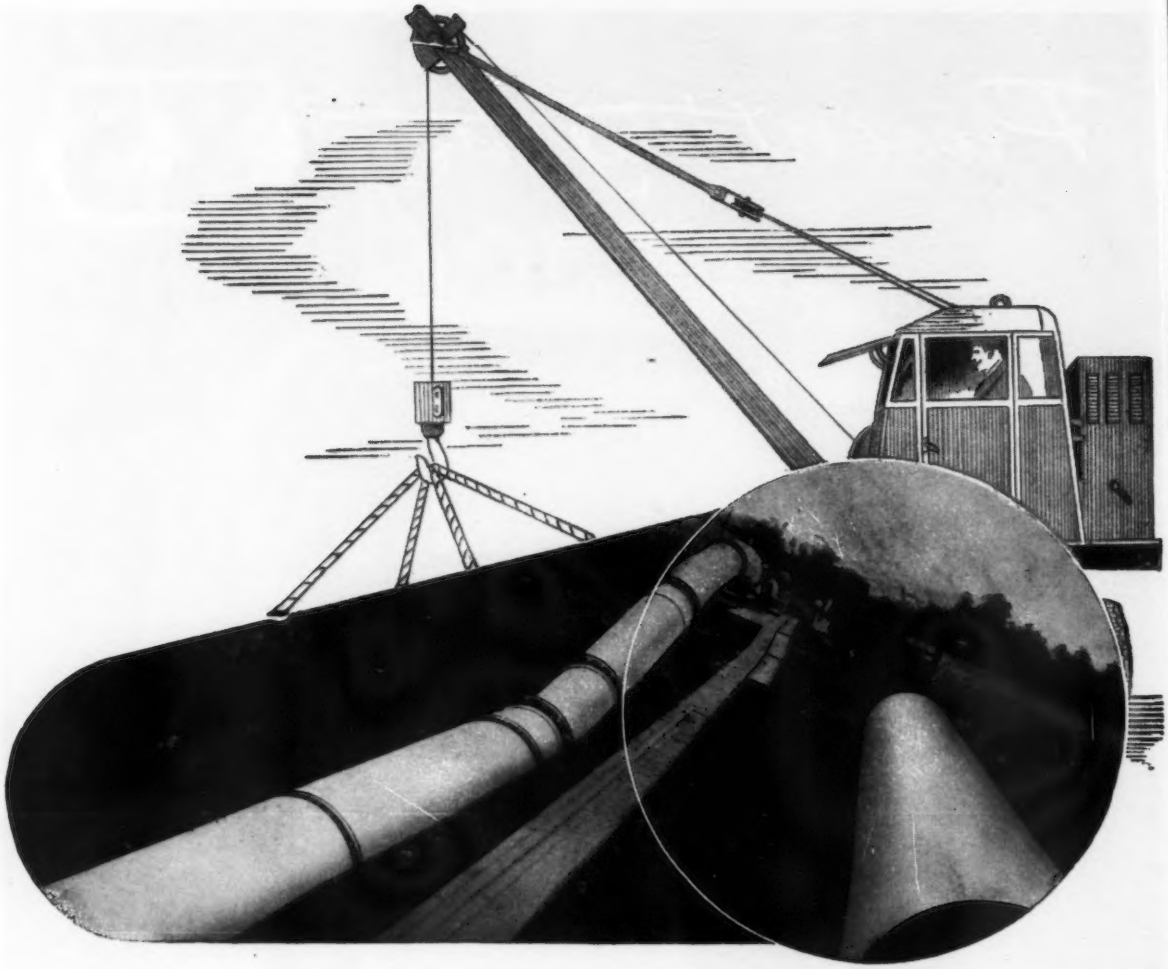

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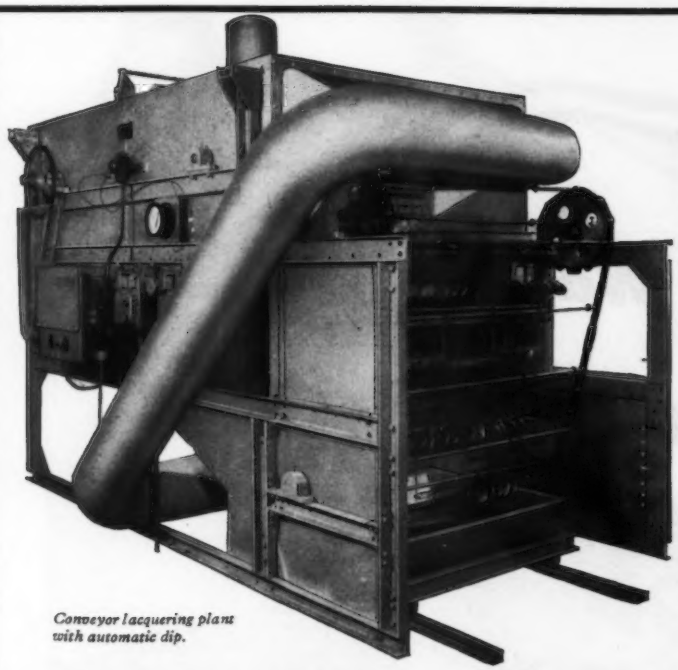

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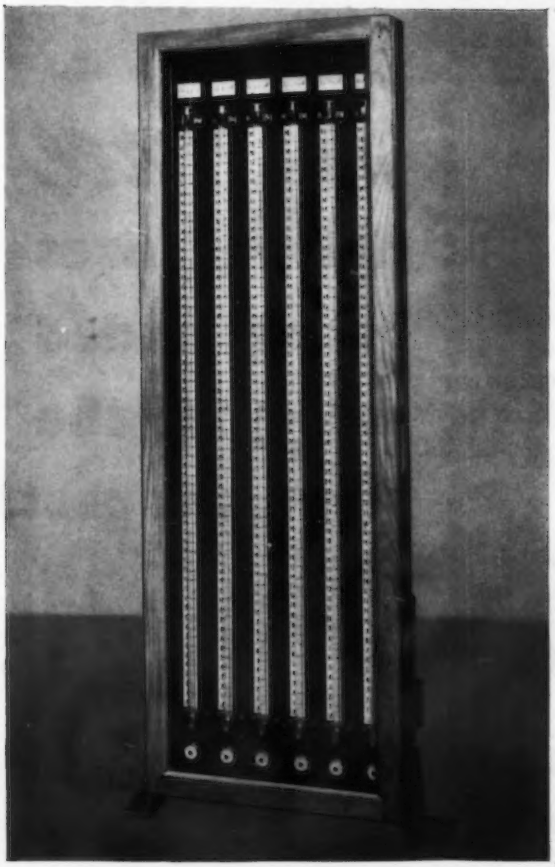

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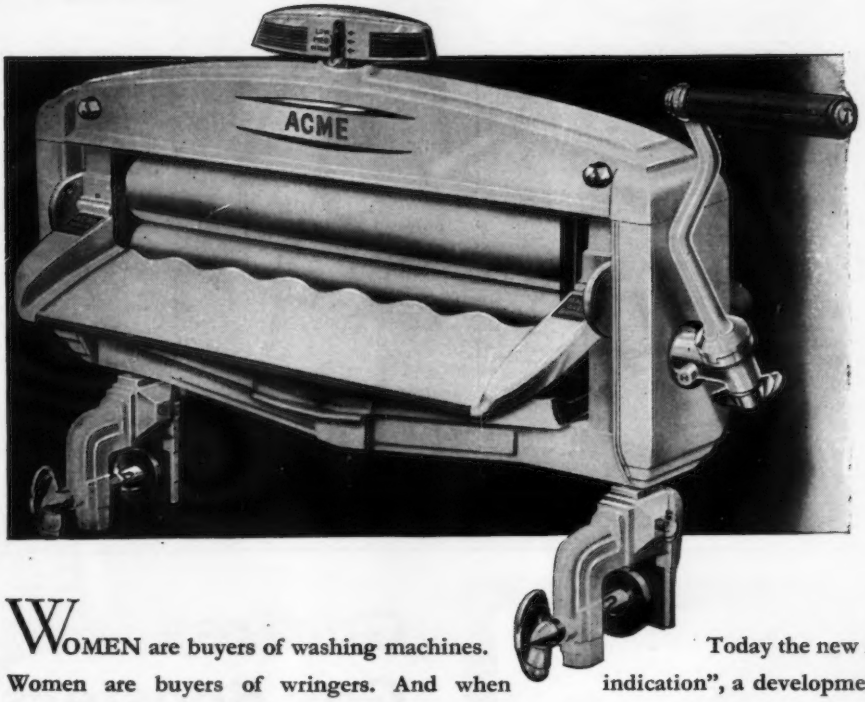

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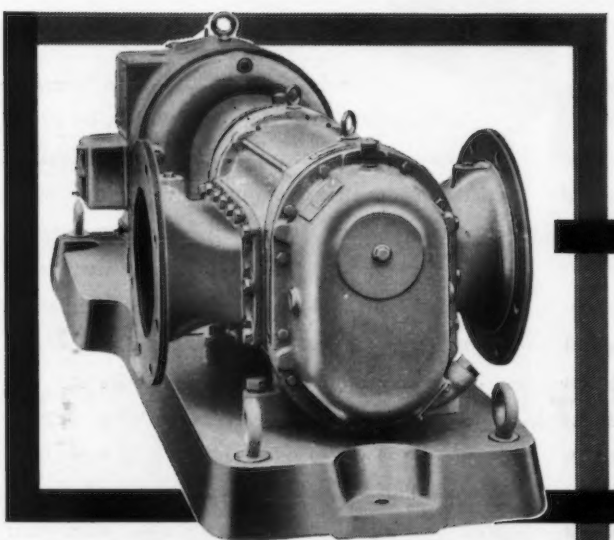

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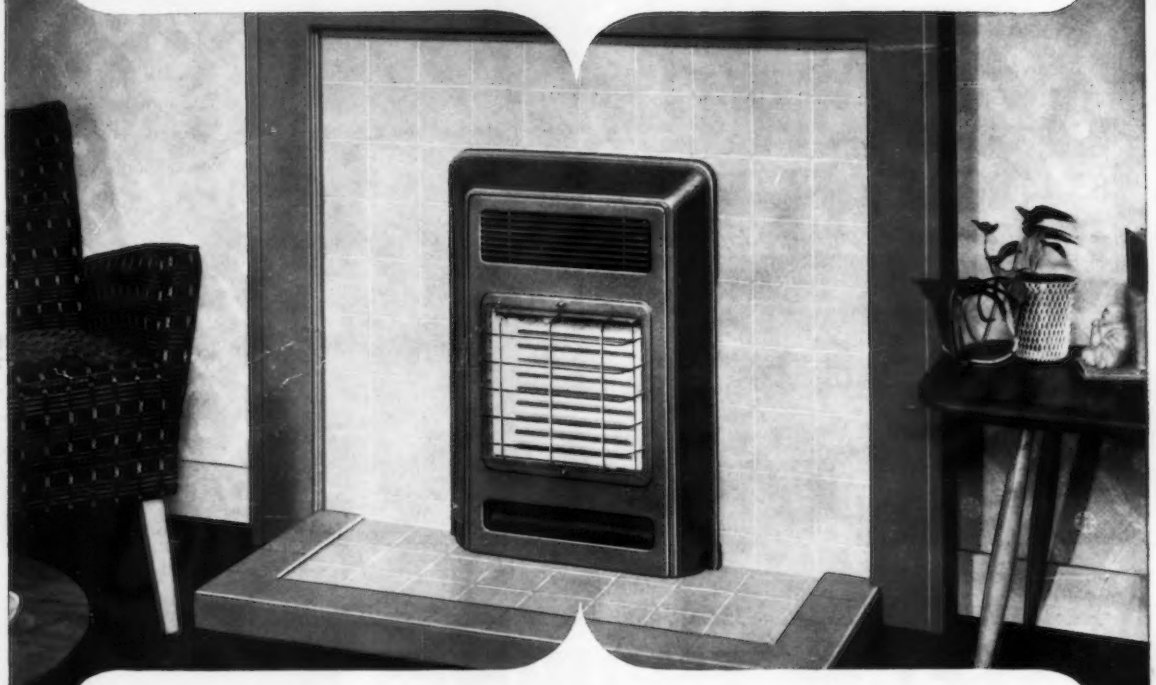

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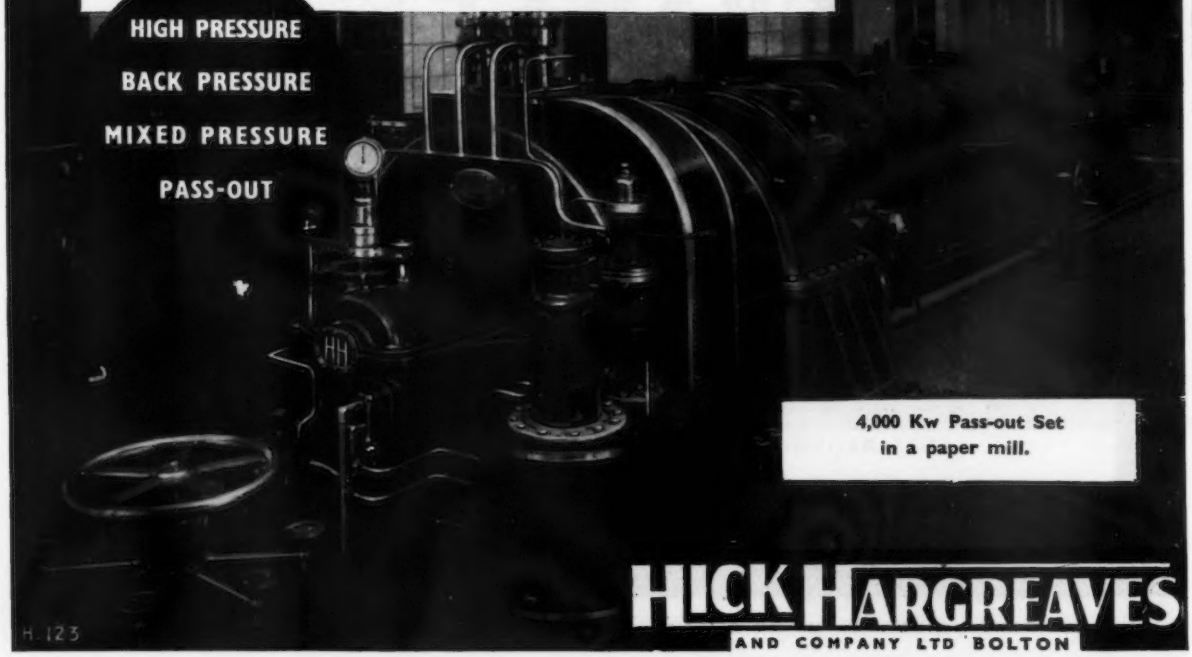

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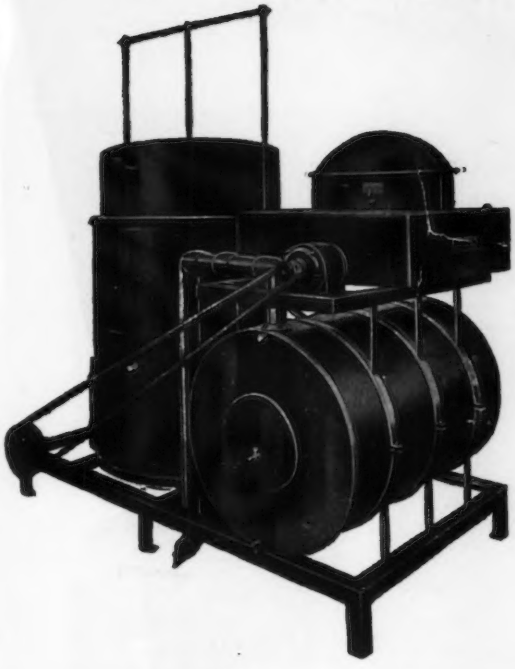

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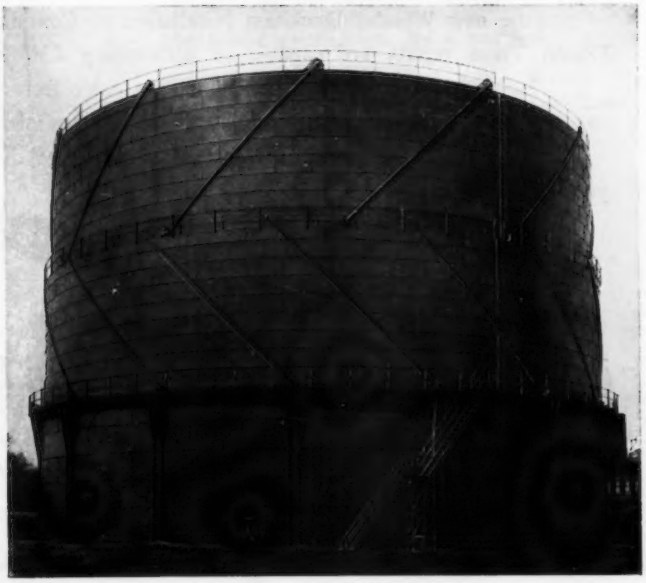

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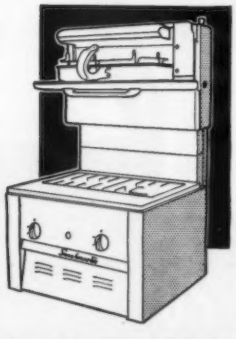

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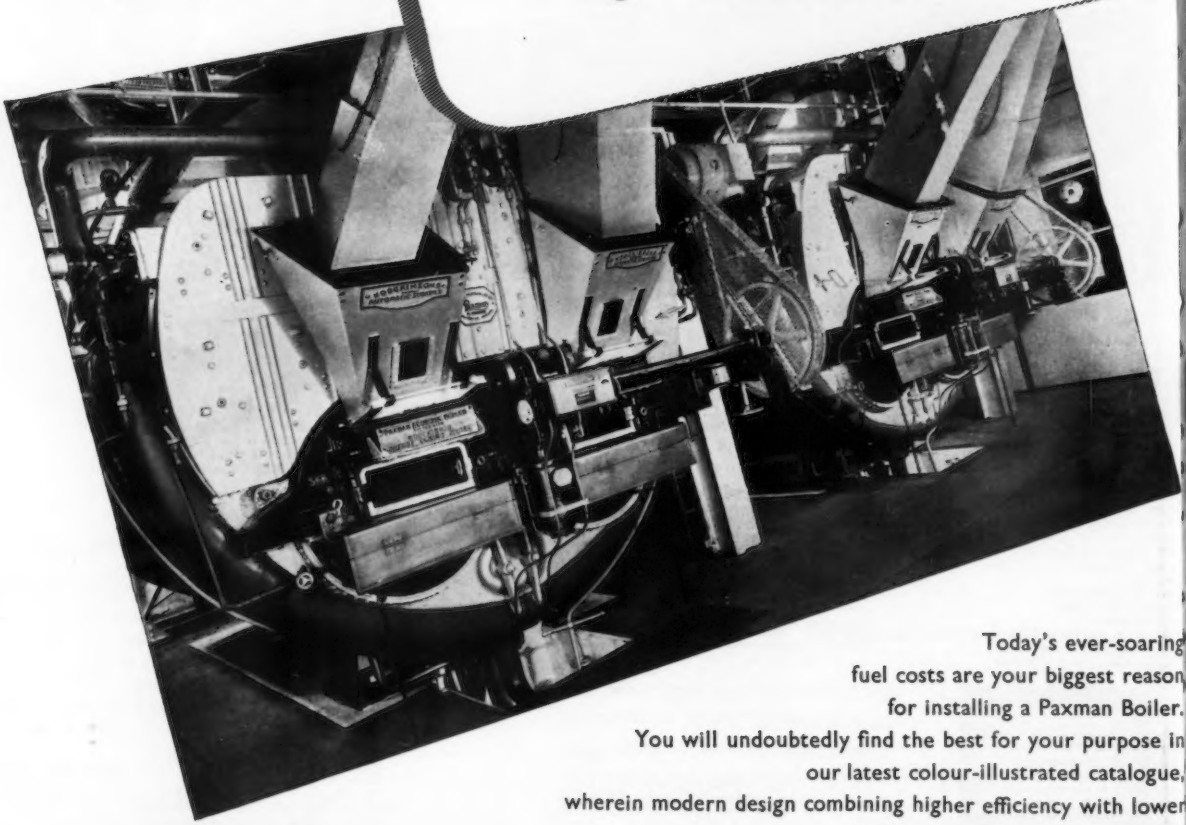

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Gas Journal

VOL. 290 NO. 4890 April 3, 1957

109TH YEAR

MANAGING DIRECTOR: Clifford A. King

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Published by Walter King Limited,
11, Bolt Court, Fleet St., London, E.C.4

Telephone: FLEet Street 2236-7 Telegrams: Gasking, Fleet

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PUBLISHERS' NOTICE, See Page 631, March 20, 1957

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GAS METERS

Gas Journal

VOLUME 290. No. 4890. APRIL 3, 1957. 109th YEAR

Selling a Heat Service

A FEW weeks ago we commented on the commercial officer's place in a primarily engineering association. The remarks were occasioned by Mr. L. C. S. Poulter's paper to the London and Southern Section, a paper which stressed the necessity for greater specialisation in sales matters and was based on the fall, slight but nevertheless ominous, in the domestic gas load. That Mr. Poulter is not alone in his contentions is shown by the fact that another I.G.E. Section has received a very similar paper from another commercial officer. This time it was the North of England Section and the author was Mr. Alan S. Middleton, Commercial Officer of the Northern Gas Board. The paper, 'Selling a Heat Service,' is somewhat militant in character. One has the impression that Mr. Middleton, finding himself surrounded by gas engineers, was determined to show his audience that preoccupation with gas-making techniques was all very fine but unless the product had a safe and preferably expanding market they were all wasting their time. In this we imagine he succeeded, and in so doing showed quite clearly how vital it is for the engineer to have a clear knowledge of, and interest in, the commercial situation.

However, the bulk of his paper was concerned with the commercial load as it is represented in his area. The facts are these: Although between March, 1951, and 1956, overall sales of gas in the area of the Northern Gas Board have increased by 13%, the increase is in fact wholly industrial; while industrial sales have increased by 27% over the period, domestic sales have fallen by 4%. Mr. Middleton lists various causes which may have contributed to this falling trend. They include a reduction in the average size of families, a lessening of population density so far as the number of dwellings is concerned, so increasing the number of consumers (and meters) without a proportionate increase in the number of persons served, the improved efficiency of modern appliances and a development of the habit of eating out with commercial load replacing the domestic load to some extent. Most of these were also listed by Mr. Poulter, but one new suggestion is the growing popularity of canned and other semi-prepared foods which require little fuel for cooking but only need warming up with a consequent reduced fuel consumption. 'At a time when so many young married women are doing full-time jobs the effect of this development in comparison with former habits which entailed the cooking of complete mid-day meals must, I am sure, be exerting some effect upon our domestic load.'

In common with most other boards the Northern is finding that while local authority new housing is bringing in satisfactory gas business, gas is thinly represented in new private dwellings. Unfortunately, Mr. Middleton does not put forward any definite suggestion for wooing the private builder or making a direct contact with the house purchaser. This is a knotty problem but it is one which must be solved.

However, the author makes some interesting observations on simple hire in relation to appliance replacement. He reveals that there are at present 220,000 cookers on simple hire in the area and of these only one-third are either partly or wholly enamelled, while 5% (11,000) are of a pattern without packed insulation. These hired cookers cannot be regarded as in any way truly representative of what gas can offer and they stand in sharp contrast to the newer and more stylish appliances of our competitors. 'The same is true of the majority of the 70,000 space heaters, mainly fires, which are still on simple hire. Many of these are of outmoded design and fall short of the standards of efficiency which we expect today. Moreover, they are commonly much in the public eye, in waiting-rooms, offices and the like, constantly bearing mute testimony to the indestructibility of the cast iron of which they are made and to changes in design and appearance which have passed them by. These museum pieces constitute continuous negative publicity for gas and the sooner they can be made to disappear, the better.'

However, Mr. Middleton does not condemn simple hire out of hand. He regards appliances as a means to an end—to sell gas—and points out that there is no easier way to get appliances installed than to hire them out at a rental sufficient to cover capital and amortisation costs. And here he comes to the point: 'It is essential, however, if simple hire is to be part of our commercial policy that a definite plan of replacement of obsolescent appliances at a fixed annual rate should be devised. When an appliance continues to be capable of earning a rental even though it is obsolete, considerable strength of mind is required to scrap it and embark

capital on its replacement. It is so easy to postpone the inevitable year by year until the problem assumes the serious proportions of that associated with the black cooker.' That there is a case for simple hire in selected instances he feels to be beyond doubt, especially when the hired appliance can effect a painless introduction to a new gas usage, but he is equally convinced that it needs to be used with extreme care and with proper safeguards.

Turning to privately owned cookers, the rate of replacement during the years 1951-56 was about 6% which converted to terms of cooker life is 17 years. However, the level of replacement last year was just under 6% and for the current year will probably not exceed 5.3% —in other words, replacement every 20 years. Of the home laundry load Mr. Middleton has few words of comfort but we are glad to note that his views on the space heating potential roughly coincide with our own. He believes ' the Clean Air Act may well be the beginning of a movement, perhaps very slow at first, but quickening year by year, towards a much greater use of refined fuels in controllable appliances.' Pointing out that the gas industry should play its part in two ways, by the provision of coke, and by gas, he adds: ' If coke is to fulfil any major rôle in the changeover and if it is to become established as a basic refined fuel, then means must be found to produce and market it on standard ranges of sizes and combustion characteristics.'

Mr. Middleton thinks the success of a drive to substitute gas for raw coal will largely depend on three things. The first two are the development of more efficient appliances—' already there are signs that in the not too distant future we shall be in a position to market convector space heaters of efficiencies one-third as much again as some of the best now available ' and truly promotional tariffs. The third factor in the situation, the overcoming of the load factor problem, he lays firmly upon the shoulders of the technical experts. ' We are in business to sell heat for various purposes including space heating. Space heating requirements must be largely dependent upon outside atmospheric conditions so that obviously the demand is greatest in the winter. *I am quite unable to accept any argument which, because of supply difficulties, would involve a limitation on the acceptance of space heating loads because they are inconvenient in winter. If we are selling heat we must be ready to provide it when the consumer wants it, not when it suits us to supply it'* (our italics).

From all of this Mr. Middleton turns to sales methods and showroom facilities, and gives a passionate defence of publicity. He concludes by bringing the whole business back to the engineer's doorstep and, as it were, leaves the bundle there for them to take in and care for. It must, we think, have been a very stimulating meeting, the sort of meeting which should be held more frequently. This is indeed an age of specialisation and because of that it is all the more important to ensure that there is an exchange of opinions between people performing quite different functions in the running of the same machine. As Mr. Middleton puts it: ' We must realise that specialisation must follow upon the integration of small undertakings into large agglomerations. But this does not mean that each of us can remain wholly confined within our own little watertight compartment, knowing little—and caring less—of what is happening round about us. One of the most pressing problems of modern management is to find a way of organising specialists without destroying the spirit of unity of purpose which must be ever present if a business is to be truly efficient.'

Early on in his paper, the author asks whether the gas industry is sitting back, basking in the sunshine of past prosperity, feeling confident that its consumers, whom it has served so well in previous decades, will remember past achievements and continue to support the old firm, buy its appliances and be grateful for the opportunity to do so? Or is it facing up to the fact that these are strenuous and laborious days, fraught with grave danger unless courageous action be taken? Is it alive, he asks, to the situation and meeting the challenge —as it within its power to do—by joining in the general attack on consumer markets with all the forces at its command?

On the whole we conclude that he does not think the industry is doing all it might to meet the challenge, but we feel that a few more papers along the lines of this one will help to get things moving.

Coal and Coke Testing

THE days have passed when the quality of coal supplied to large consumers, notably the carbonising industries, was so good and so consistent that testing was almost pure routine, and when coal of this quality was so plentiful that such consumers could specify the seam from which they would buy it and be certain of getting it. In those days the mining of the coal by hand as well as its abundance had much to do with its quality; the amount of small was low and the marginal rock from above and below the coal seam either never came up the pit to the surface, or if it did, was carefully and consistently picked out by hand on the picking belts before the coal was graded and taken to the washery. In the past, too, when gas coke was not held in the high esteem it is now, there was little necessity for the constant testing of its quality.

Today the shortage of coal, the increase in its industrial consumption, and the demands of the Clean Air Act have changed the whole outlook of the coal suppliers and enhanced the value of both gas and furnace coke. Since the price structure of coal now depends on its calorific value, and the gas industry demands the highest grades, it has become of the greatest importance that the quality of coal being delivered to the gasworks should fall into the price range agreed to by the gas industry and, at the same time, guarantee that consistent yields of the calculated quantities of gas per ton of coal are being maintained together with a consistent quality of coke.

This involves the constant testing of all consignments from the collieries, but before individual tests can have any significance they must be repeatable to within a reasonable degree of accuracy. This depends on rigidly standardised apparatus and equipment and, perhaps as important as anything, on rigidly standardised methods of sampling. Their importance has been recognised by the British Standards Institution which has laid down specifications for both coal testing and coal sampling.

But how often should a sample be taken? It could be taken from every wagon or every barge of every consignment, but this would be a waste of time and

manpower if the coal quality were consistently good. Statistical analysis, therefore, must be employed to calculate how often a consignment of any given type of coal from a particular colliery need be sampled and tested to ensure that any deviation from the normal is detected with the minimum expenditure of manpower and time.

In his paper to the Manchester Juniors Mr. A. Gibson describes the arrangements in the Liverpool Group of the North Western Gas Board. Here a central laboratory has been set up at the Wavertee works—easily accessible for the other manufacturing stations in the Group—to which all coal samples at the works are sent for testing. This has proved to be by far the most satisfactory means of quality control.

On-the-spot testing might appear to have certain advantages but it has been proved at Liverpool that such advantages are outweighed by centralised testing, where specially trained chemists undertake the work and can keep an overall check on the coal arriving at all works of the Group. By keeping the station engineers informed by means of analyses at regular intervals, local conditions at each works can be adjusted for any change, sudden or gradual, which may be taking place in coal quality.

Seen With More Confidence

HOW successful was the adventurous Gas at Work in Industry exhibition? It would be easy to make the general comment about publicity of this type that it depends on how much space appeared in the newspapers, and how many orders were placed on the stands. But the generalisation would not be true. There were immediate results: A great deal of editorial 'backing' was given in many newspapers, ranging from the national and London suburban and provincial Press to the numerous trade and technical papers interested in the subject; of the 10,000 visitors 5% made genuine enquiries of which percentage 10% have yielded firm orders. But, as Mr. A. E. Tyrell, Manager of the Industrial Section, North Thames Gas Board, pointed out to a meeting of exhibitors the other week, 'We are not selling things normally sold over the counter, or over short negotiations.' Another 10% of the enquiries, he added, were also excellent 'prospects'—some of them for the sale of very large equipment. In addition there had been enquiries from eight places abroad, no doubt as a result of the news release sent out by the Central Office of Information to 60 overseas countries.

The chief fact that emerged from the discussion by the manufacturers at Murdoch House was that this novel form of exhibition ought to be repeated—every two years, it was suggested. It seemed clear, however, that the essentially enterprising character of the exhibition was created because it was sponsored by some area boards working together, and was not the responsibility of the Gas Council. Something of this would be lost, surely, if the initiative were given to the national body, however much greater their resources are.

Mr. Tyrell put forward three basic arguments: He believed the exhibition was a success; that economically it would in time show a high yield from the investment involved; and that industry had been shown that gas was a live feature of automatic heating processes. Many people went away surprised that the industry had such a wide range of controls. A place for gas was ensured in the automatic factory.

There was, of course, no real argument with Mr. Tyrell's points; some suggestions were made by manufacturers, some minor criticisms of detail, but no one who saw the exhibition will question this statement, made towards the end of his summing up: 'There is little doubt,' he said, 'that the industrialist is looking at us now with more confidence.'

Personal

MR. G. D. PHILLIPS, M.B.E., formerly Advertising and Shows Manager of the Fatstock Marketing Corporation Ltd., has been appointed Publicity Manager to the Southern Gas Board. MR. J. F. DORAN has been appointed Sales and Service Manager for the Board's Southampton Region which covers the whole of Southampton and extends to Winchester, Andover and Salisbury. Mr. Doran has been in the gas industry for 22 years, commencing his service with the Gaslight and Coke Company in their research laboratories in 1935. Throughout the next 12 years he served in the major laboratories at Watson House until 1947 when he was appointed Service Supervisor and served at Westminster, Walham Green, Edgware Road and Kilburn. He was subsequently Manager of the Hornsey District of North Thames Gas Board upon its reorganisation, and then Manager of the Commercial District. For the past two years Mr. Doran has been responsible for sales in the North Western Division of the North Thames Gas Board.

Obituary

LIEUT.-COLONEL JOHN KENNINGTON, D.S.O., M.C., who died at his home at Laceby, Lincolnshire, on March 23, was particularly well known and respected in the gas industry. Prior to nationalisation, he was Engineer and Manager of the Great Grimsby Gas Company, and from 1949 until his retirement in 1951, Manager of the former North Lincolnshire Sub-Division of the East Midlands Gas Board. He was President of the Eastern Counties Gas Engineers and Managers' Association in 1941, and he also served on the Council of the Institution of Gas Engineers as their representative. He was a member of the Institution's Benevolent Committee and intensely interested in its welfare. For many years he was a member of the District Committee of the Federation of Gas Employers, National Gas Council and Joint Industrial Council, and served as Chairman. He was a man of high standards and had attracted to himself, among his associates, a great affection; all who knew him respected his ability and valued his friendship. Colonel Kennington had an impressive record in the first world war. He was gazetted to the 10th Chums' Battalion of the Lincolnshire Regiment as a Lieutenant in September, 1914. He was promoted Captain in March, 1915, and Major in October, 1916. In August, 1918, he was given command of the 1st Battalion of the Royal Warwickshire Regiment which he led with considerable success during the hundred days' fighting which ended in the Armistice. He was noted for his fearless leadership and was awarded the M.C. and D.S.O. and was mentioned in dispatches. He had many interests in social and public life. He was a Deputy Lieutenant of the County of Lincolnshire, Chairman of the Caistor Magistrates' Bench and a past Chairman of the Grimsby Chamber of Trade and Commerce. He was intimately associated with education, soldiers' welfare, 'Toc H,' and was a staunch non-conformist. The tribute paid to him at the funeral service at Riby Church on March 26 was deeply impressive, acknowledging the respect in which he was held.

GAS WILL SUPPLY THE POWER

Dual Fuel Internal Combustion Engine To Be Part of Generating Plant

FOR the first time a dual fuel internal combustion engine is to be included as part of the generating plant in the independent power-house at the Bath and West Agricultural Show to be held at Swindon from May 29 to June 1.

This transportable power-house each year provides all the power and hot water required by exhibitors, herdsmen, and caterers throughout the vast showground.

As on previous occasions the main equipment will consist of two 400 kW. alternator sets incorporating Lister-Blackstone ERS8 turbo-charged diesel engines, each with an output of 600 B.H.P. at 750 r.p.m., driving E.C.C. alternators.

COMPLETE FLEXIBILITY

This year in order to secure complete flexibility and to demonstrate the potentialities of obtaining a supply of electricity from gas, a dual fuel engine-driven alternator will complete the plant.

Comprising a Lister-Blackstone six-cylinder duel fuel engine, type EVDF6, running at 600 r.p.m. and direct coupled to an E.C.C. single pedestal bearing alternator, this set will be connected by the South Western Gas Board to the town gas supply. The output from the engine when running on town gas is 220 B.H.P., 150 kW. being available from the set, while on diesel oil the corresponding figures are 270 B.H.P. and 185 kW.

Dual fuel engines are designed either for straight diesel operation or for operation on a gaseous fuel with a small percentage of diesel fuel injected to initiate the combustion process. Basically the construction of duel fuel and straight-forward diesel engines is the same. The principal modifications of design provide for the admission to the cylinders of a correct mixture of gas and air and an accurately timed and metered quantity of diesel fuel to start combustion.

Since the engine air starting equipment is not required once the engine has been started on diesel oil, use is made of the air starting manifold and air-start non-return valves in the cylinder heads for the admission of the gas for dual fuel operation. It is, therefore, unnecessary to complicate the engine with either an additional gas manifold or extra inlet valves.

SECOND SET OF PUMPS

A feature of Lister-Blackstone dual fuel engines is that in addition to the standard fuel pumps provided for diesel running, a second set of smaller pumps

The millionth visitor to the Ideal Home exhibition, Olympia, was Mr. H. A. Perry of Hampton-on-Thames. He is pictured receiving a gift of the millionth refrigerator produced by Electrolux Limited, from Mr. J. B. Redman, General Sales Manager.

is also fitted, which accurately meter the small quantities of fuel required when operating on gas. Both the main and auxiliary fuel pumps deliver to a common injector nozzle in each cylinder head, thus enabling cylinder heads of standard design to be used.

The auxiliary pumps are mounted over the air inlet manifold and work in conjunction with a secondary camshaft which is gear driven from the main camshaft, at the flywheel end of the engine. This secondary camshaft is also used to operate the valve gear for the gas inlet valve (cum air start non-return valve) in each cylinder head.

For straight diesel operation the engine working parts and governor control are precisely the same as for standard oil engines. On changing to gas operation, however, the main fuel pumps are isolated and lubricating oil pressure is fed to two servo-cylinders. These open the auxiliary fuel pump racks to a pre-set stop and open the main gas valve, admitting gas to the engine.

Thereafter the engine power and speed are determined by the settings of butterfly valves in the air and gas inlet manifolds. These valves are controlled by a hydraulic booster which is operated from the engine governor.

MANY ADVANTAGES

Lister-Blackstone dual fuel engines are nominally of the same 12-hour rating as the equivalent straight diesel engines. It will be appreciated that the possible output of a dual fuel engine is dependent on the calorific value of the fuel used, and with town gas (450-470 B.Th.U. calorific value) the output is reduced by 20%.

For dual fuel operation the engine on full load requires approximately 6,300 B.Th.U./B.H.P. per hour from the gaseous fuel. (Volume depends on calorific value of the gas.) Fuel oil injection is approximately 7-10% of the full load consumption of the equivalent straight diesel engine.

The dual fuel engine has many advantages. It provides an alternative to fuel oil in times of shortage or in countries where the cost of fuel oil is high. It allows advantage to be taken of off-peak tariffs. It enables gas to be used as a stand-by to electricity by driving generating plant for essential services. Above all, it utilises 'waste' gas—sewage gas, mine gases or oil field natural gas—all of which contain a high proportion of methane and are obtainable at very low cost.

Wales Price Plan

Housewives in the highly populated areas of Wales may face an increase in gas charges ranging from 8d. to 1s. 6d. a week, the area G.C.C. were told last Friday. The Board wish to equalise prices. Rural consumers would benefit from a reduction of between 1s. 2d. and 1s. 10d.

NEW AYR MAIN ENSURES ADEQUATE GAS SUPPLIES

THE fulfilment of plans laid almost eight years ago took place recently when the final link in a new gas main in Ayr was completed. Of 12-in. diameter and almost three miles long, the new main connects the gasworks in Cromwell Road with the heart of the housing development area at Forehill. Besides assuring that there will be adequate gas supplies in the new housing area both now and in the future, the new main will also improve gas supplies in other parts of the town.

Up to the present, the gas supply to Forehill has been provided from the existing mains in the Castlehill area, and these have become over-loaded.

A start has also been made in providing a link main between the new 3 mill. cu.ft. gasholder at Weir Road with the gasworks on the south side of the River Ayr. This new main, which will also be of 12-in. diameter, will enable the Cromwell Road works to draw gas from the new holder, or if their own stocks are high, to feed surplus gas into it.

The total cost of these new projects is in the region of £30,000, and the effect of them will be to improve gas supplies in the town.

THIS FIRM USES OVERHEAD RADIANT HEATING ON THE GRAND SCALE

THE advantages of high level heating by gas are rapidly becoming more widely appreciated, and a notable example of its capabilities can be found in the Queens Works of W. H. Allen, Sons & Co., Ltd., Bedford, which produces diesel engines, gas turbines, steam turbines, generators, and switch gear.

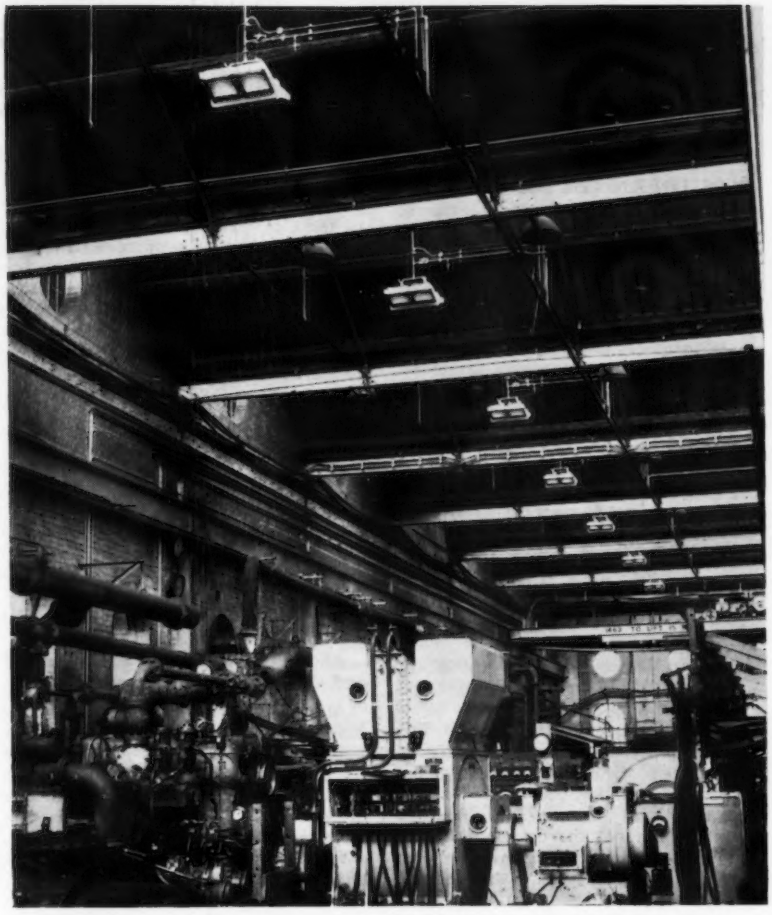
Gas is used on the premises for many process applications, including heat treatment, armature baking, core drying, water heating and soft metal melting. The offices are warmed by gas fired boilers and all the appliances in the canteen are operated by gas. The annual gas consumption is in the region of 95 mill. cu.ft.

This firm was one of the first in Bedford to adopt this method for large scale factory heating. The initial installation—fitted in 1936—consisted of about 200 Radiant Heating No. 1 surface combustors. These heaters have now been replaced by more modern types and additional shops have been fitted with overhead heaters, the latest being the steam test bay with an installation of 11 4-unit Bratt Colbran Satellite heaters.

The total number of heaters now in commission is approximately 350, including Mastertherms, Radius Newtherms, Harris Schwank heaters, Bratt Colbran standard panel heaters, and Satellites.

For the latest installation the satellite heaters are mounted at 25 ft. from floor level, being operated by switch in banks of three and one bank of two, each bank being thermostatically controlled.

The reason for separate thermostats is that when steam equipment is undergoing tests considerable local heat is produced, thus rendering unnecessary the heaters in that particular zone.



A general view of the steam test bay at the W. H. Allen, Sons & Co., Ltd., Queens Works, Bedford, showing heaters at full incandescence.

Phimax: Those Great Expectations Were Exceeded, Says Report

AN interim report to the North Western Gas Board on the public reaction to Phimax, the Board's new domestic smokeless fuel, submitted by those concerned with its distribution, says that in the nine weeks since it was introduced to the public sales have exceeded the expectations of the distributive trade, and of the Board itself.

Orders received have averaged 732 tons per week and are now running at about double the rate experienced in the first week. The average amount ordered at a time by individual householders has been 3 cwt.

The total quantity of Phimax sold during the first nine weeks was 6,588 tons.

Repeat orders now form just under half of all orders received by distributors and about one-third of the orders received direct by the Board. About three-quarters of all sales have been executed by the distributors, the remainder direct by the Board through its showrooms and service centres.

Both the distributors and the Board consider that a longer experience is necessary to assess the full impact.

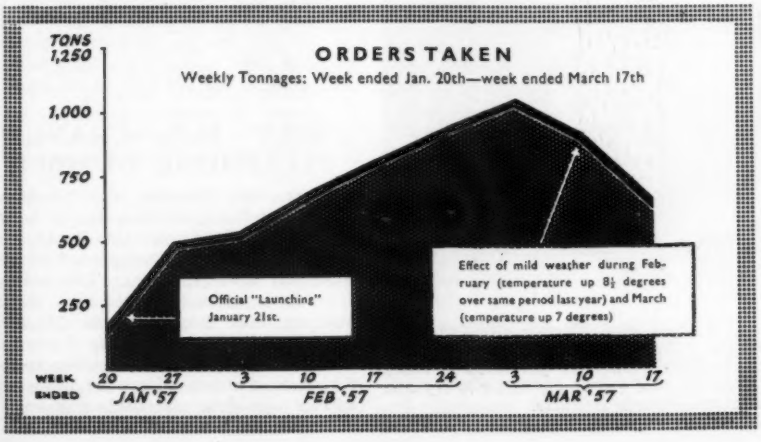


Chart showing sales of Phimax.

Down Come The Antiques As Network Plans Take Shape

69-YEAR OLD WINCHESTER HOLDER FOR SCRAP

SOUTHERN Gas Board announce that they will shortly begin to dismantle the gasholder in Water Lane, Winchester. The station was built in 1888 when it became the second district gasholder for the old gasworks in Staple Gardens. During erection a Roman urn was found on the site.

Capacity of the gasholder is approximately 100,000 cu.ft. and it served some of the City area but particularly the St. Cross, Twyford, Shawford and Otterbourne districts. The Board indicated to the local authority some time ago that as integration of distribution became possible it was hoped to dispense with the holder and give an even better supply of gas locally.

The new main from Southampton is already serving the districts concerned. The small amount of gas still in the holder will be taken out and a purging machine will be used to make sure that not the slightest trace remains. Connections in the road will then be severed and dismantling will commence, the intention being to clear the whole site which comprises about one-fifth of an acre. The Board will then dispose of this particular property.

About 100 tons of scrap will be realised and should cover the cost of demolition.

Mr. Dawes, of Winchester, has been holder attendant at Water Lane for a number of years; he has in fact a total of 34 years of service with gas in Winchester and will now work at the Winnell works. The new arrangements have been carried out by Mr. G. Neil, Regional Production Engineer, Southampton, and Mr. R. K. Harrison, Regional Distribution Engineer, Southampton.

Managers Need Incentive Too

—*Conference Theme*

Incentives for top management is the subject of a talk to be given at a Gleneagles, Scotland, conference from May 3-5 this year. The conference is to be held by the British Institute of Management.

The talk will be given by Mr. W. H. Leather, of Robson, Morrow & Company. 'Top management can be a lonely estate,' writes Mr. Leather in the advance programme of the conference, 'men need deliberate encouragement and fostering if they are to produce the best that is in them. Purely financial incentives are not the only ones which can be applied to management. When they are used, however, they should provide for prompt payment based upon a simple calculation.

A general view of the Scottish Gas Board, Glasgow and Western Division stand now in the School Boys' and Girls' Exhibition at the Kelvin Hall, Glasgow. This year the stand emphasises careers within the industry. Girls are permitted to make scones and biscuits, and for the boys there is an oxy-coal gas profile cutter to try out, copper tubing to bend, and laboratory tests to make.

In Brief

NEW SHOWROOM OPENING CEREMONY

PRESENT at the opening of a new gas showroom in Stirling Street, Denny, near Falkirk, were Mr. D. D. Burns, Deputy-Chairman of the Scottish Gas Board; Sir Robert Nimmo, Chairman of the Scottish Gas Consultative Council; Mr. D. D. Melvin, member of the Board; Mr. D. J. Colvin, Controller of the South-East Division; and Mr. R. H. Bone, Commercial Manager of the Board.

Later the party inspected the gas water heating systems installed at a re-constructed block of flats in Duke Street, Denny. The flats, known as a 'two-person house,' each have a gas-operated water heating system which can heat 20 gal. at a time. The system also incorporates a gas boiler and wringer.

Members of Ludlow, Church Stretton, and Craven Arms staffs of the West Midland Gas Board centres held their annual social club dinner at the Angel Hotel, Ludlow, recently. Among the guests was Mr. W. Oldham, Divisional General Manager.

Scottish G.C.C. meeting in Edinburgh last week, decided to support the North Western Area Consultative Council in a plea to get some relaxation of hire-purchase restrictions on cookers and heaters. It declined to widen the field to include washing machines.

North Thames Gas Board have been saved nearly £2,000 in the printing of a new street directory by the use of a 'revolutionary printing technique,' claim the printers, Victoria Printing Company.

Long-service awards were presented to 28 employees of the North Thames Gas Board, each with forty years service, by the Chairman of the Board, Mr. Michael Milne-Watson, at a recent ceremony.

Over 350 Council house tenants at Windsor are to be asked if they would like to buy the gas cookers at present hired in their homes from the Council. The cookers are for sale at £4 each.

GROUP H.Q. CHANGES TELEPHONE NUMBER

From last Monday the telephone number of North Cheshire Group headquarters, North Western Gas Board, will be changed from Stockport 5201 to **Stockport 6101** (10 lines). The address for correspondence will be: North Western Gas Board, North Cheshire Group, P.O. Box No. 44, Portwood House, Great Portwood Street, Stockport, Cheshire. Correspondence for all Group officers should be addressed as above.

Company Meeting

Radiation Limited

ANNUAL GENERAL MEETING: SPEECH OF MR. W. D. KING, CHAIRMAN

At the annual general meeting of Radiation Limited held on Tuesday, April 2, 1957, at the Chartered Insurance Institute, Aldermanbury, London, the Chairman, Mr. W. D. King, said:

Before I deal with the accounts, I must refer to the fact that as a consequence of the appointment of Dr. H. W. Melville, F.R.S., to be Secretary of the Department of Scientific and Industrial Research, he has found it necessary to resign from our Board of Directors. My colleagues and I accepted his resignation with much regret, as we have valued his advice greatly during the years he has worked with us.

The annual report and accounts show that the profit for the year was £491,286 which is a reduction of £490,911 on the profits for the preceding year. To have achieved this result in spite of the obstacles set in the way of trading by general economic circumstances, has required unrelenting effort.

National Economic Policy

The situation arising out of restricted credit, which I detailed in my last statement to you, has continued throughout the year. It is, unfortunately, very much easier to reduce markets suddenly, than it is to adapt a complex production organisation to a new level of operations. But the primary task is to ensure that adaptation is made as rapidly as possible, and to take every possible action to see that total costs are attuned to prevailing conditions. So far as it lies in our power, it is necessary to take a responsible attitude to the requirements of national economic policy. One of those requirements, which has been urged strongly on industry, is to exercise the utmost restraint towards advancing prices.

The effect of reducing the level of operations is to increase costs. When the margin between properly adjusted total costs and restricted prices is insufficient to provide rational financial safeguards for all concerned with the present and future of the individual business, one of two things can happen. Either prices have to move up, which is contrary to national economic policy, or there has to be sufficient relaxation of the factors limiting production to correct the rise of real costs.

In our view, the time has come when there is sufficient evidence to guide the necessary adjustment of credit trading terms for durable household goods, to try to retain for the consumer the advantages of large scale production, which we have demonstrated over the years, is a very real economic fact, and the advantages to the fuel producing industries of a reasonable domestic user market without which their own costs tend to rise, which is equally contrary to national economic policy.

It is not the case for the wholesale removal of restrictions which we advance, for we all suffer if inflation is not checked, but for a factual appraisal of how much adjustment is necessary to correct what appears to be the uneven burden borne by industries which lend themselves to easy control by credit trading restrictions.

You will notice that the Profits Tax takes a higher proportion than in 1955, resulting from the increase of tax on both distributed and undistributed profits.

Investments in British Government Stocks appear in the balance sheet at £2,117,133. The market value at December 31, 1956, was £1,734,875. The difference of £382,258 is partially offset by the investment reserve of £238,616. Your Board do not consider it necessary to make a specific reserve for the balance of £143,642 as the securities are almost entirely in dated stocks repayable at par, which is 5% greater than the book value. Since the date of the accounts, the value of these investments has appreciated by £90,000. Loans to municipal authorities are all repayable at par at varying periods up to 1962. The trade investment is the value of the investment in the Australian Company, in which your Company has a half interest.

Dividend

Stockholders will readily appreciate why it was necessary to take the unpalatable step of not paying an interim dividend on the Ordinary stock, during the year. The dividend now proposed is 7%, as against the total dividend of 11¼% in 1955. Although the margin of undistributed profit is slight, your Board, in proposing the dividend, has had regard to the inherent strength of the Company, and to the progress already made in meeting current conditions of trading.

Home Market and Exports

In spite of the restrictions on the home market, our programme of new appliances has made good progress and the effect of these should begin to become apparent in the current year's trading. You will not expect me, in these difficult times, to indulge in firm forecasts of what the future may hold. I can only say that there are signs of slight improvement.

The restrictions in certain of the markets in the Dominions to which I referred last year, have continued. Our exports to Dominion and foreign markets reached approximately the same level as in our peak year 1955, which in all the circumstances is a creditable performance. We have made marked progress in the sales of appliances for bottled and natural gases. The major problem of all exporters is to try to maintain competitive prices overseas, and the state of home trade inevitably has a considerable influence.

Last year we purchased a works in Melbourne jointly with our distributors in that country, and it is a pleasure to report that the works are in production with New World cookers and gas fires. By the end of this year we anticipate that they will be producing to capacity. Active steps are being taken towards the introduction of appropriate new models in the Australian market which will enable the Company to obtain an increasing share of the growing trade.

Our subsidiary in New Zealand has been subject to many of the restrictions from which we have suffered, and, in addition, suffered a shortage of power due to lack of water at the generating station, which adversely affected production and the market for electrical appliances. As a result, the Company did not do so well as usual. The need to carry high stocks because of irregular shipments and port delays, led to recourse to overdraft facilities to which reference is made in the balance sheet.

Research and Development

It is the function of the research part of the organisation to study fundamental principles with the object of opening up new fields of activity in the use of fuels and in such matters as finding effective new materials. The recently established background research laboratories at Chelsea are steadily pursuing these studies.

The main work of development must always be to try to ensure the improvement of the many kinds of appliances for cooking, space-heating, and water-heating which make up the activities of the Group. This is not work which can be started and stopped with varying trade conditions. Indeed, just as the search for improved methods of production and more efficient plant has been intensified, so the study leading to new and improved products has been increased. The results are seldom spectacular, but one has only to consider the standard of cooking and heating appliances which were available, say, 50 years ago, to appreciate what enormous progress has been made—not in great leaps, but in unremitting attention to detail.

Nineteen fifty-six was no exception to the general rule that every year some contribution is made to the efficiency of performance, greater safety, styling to make the housewives task easier or some other of the many facets of improvement in use, on which our technicians are constantly working. It is no accident that the products of the Group have such

wide acceptance in so many markets, but good competitors keep us constantly aware that there is no room for self-satisfaction or complacency.

Clean Air Act

The recognition by Parliament of the need to remove from the atmosphere the smoke and other harmful products of inefficient combustion, which cause loss of life and enormous damage to property every year, is at once an inspiration and a challenge to manufacturers of appliances and the fuel industries. We, for our part, gladly accept the challenge. For many years we have actively supported the need for a Clean Air policy. We have recognised that there can be no clean air, so far as domestic fires burning bituminous coal are concerned, unless there are appliances available to enable such fuel to be burnt smokelessly.

We have pioneered the development of such appliances and a range of them is now available in support of the national policy.

Conclusion

The year under review has been difficult, and the immediate future looks only slightly less difficult.

However sincere one may be in making acknowledgment of the part played by all engaged in the Group, it tends to take on the air of something that has automatically to be said in an annual report. I would like particularly to say that the many difficulties have been fully shared by all our people. There has been much short time working and other adjustments to changing conditions which we deplore, and it is with real appreciation that your Board pay tribute to all those who have stood, and are standing loyally, behind the Company. The success of any enterprise depends in the finality, on people. To put it no higher, it is on them that we depend for the increased production that will undoubtedly, sooner or later, be demanded by the public we serve.

The report and accounts were adopted.

W.M. Meters Need Another 8 Mill. Shillings

EIGHT million more shillings will eventually have to be put into circulation in the Midlands because of the West Midlands Gas Board's six-year meter conversion programme.

Beginning next month, the board plans to replace 90,000 penny meters with the shilling-type and to convert 150,000 shilling-and-penny meters to take shillings only.

Members of the West Midlands Gas Consultative Council were assured that 'arrangements have been made to ensure that sufficient additional shillings will be put into circulation to meet the requirements of gas consumers.'

Further complaints of a present shortage of shillings were voiced at the meeting, and again employers were blamed for not putting shillings in wage packets.

The Council's Walsall division is to ask that the Board's local showrooms advertise willingness to 'sell' shillings to consumers.

BUT THEIR TRANSPORT WASTES NO MONEY

The West Midlands Gas Board has consulted a firm of consultant mathematicians to find out if it is employing the most economic means of transporting coal from the collieries to its production centres.

The answer, supplied with the help of electronic computers which have saved 'months and months of work,' is that its use of road and railway facilities is only 15% below the optimum.

Dublin Company Protest Over 7% Dividend Control Decision

RESENTMENT at the Eire Government's policy of dividend control was expressed by Professor Pierce Purcell, Chairman, when he addressed the annual meeting of the Alliance and Dublin Consumers' Gas Company on March 27.

Referring to the fact that a dividend of 7% was the maximum permitted by the Minister for Industry and Commerce. Professor Purcell said it was difficult to understand and accept the ministerial decision and comparisons left the Company no choice but to resent it as unreasonable and discriminatory.

In their representations they had not failed to point out the breach of understanding and the hardship which this restriction had imposed on the many stockholders, largely local residents who had invested their savings in the Company. The dissatisfaction voiced in the past by stockholders was shared in the same measure by the Board, and every means of securing improvement would be sought.

The Chairman referred to the procedure which must be adopted on each occasion before the Company could raise its prices. A public inquiry had to be held before the Prices Advisory Body, and the delay occasioned before securing recoupment had meant that money required for maintenance and development had been lost to the company.

The Chairman proposed that a final dividend for the year ended December 31, 1956, at the rate of £3 10s. per cent. actual (less income tax) on the consolidated ordinary stock of the Company be declared, same to be paid on or after March 30, 1957.

ANOTHER 2½d. FOR GAS WORKERS

A wage increase of 2½d. an hour for men in the gas industry was agreed upon at a meeting of the National Joint Industrial Council last week. Affecting about 95,000 men, the increase will cost the industry about £2½ mill. a year.

Diary

April 5. — LONDON AND SOUTHERN JUNIORS: 'Industrial Application of Air Heating by Gas,' H. R. Cooke.

April 6.—EAST OF SCOTLAND JUNIORS: Gas Showrooms, Falkirk. Address by Dr. Waddell. Visit to Grangemouth gasworks in morning.

April 8. — NORTHERN G.C.C.: 30, Grainger Street, Newcastle-upon-Tyne, 11.15 a.m.

April 9-11.—INSTITUTION OF CHEMICAL ENGINEERS: The University, Edgbaston, Birmingham 15. Midlands Branch Syposium.

April 10.—INSTITUTE OF FUEL: Institution of Civil Engineers, Great George Street, London, S.W.1. 'Koppers-Tolzek Gasification Process,' Hans Koppers. 5.30 p.m.

April 11.—EASTERN JUNIORS: The Institution of Gas Engineers, 17, Grosvenor Crescent. 2,15 p.m.

April 11.—MIDLAND JUNIORS: Staff Mess Room, West Midland Gas Board, Council House, Birmingham. President's Day.

April 12.—MIDLAND SECTION, I.G.E.: Queen's Hotel, Birmingham. A.G.M. Luncheon: 12.15 p.m. for 12.45 p.m.

April 12. — NORTHERN JUNIORS: Stockton-on-Tees. 'High B.Th.U. Oil Gas Production, Dr. G. Milner. 2 p.m.

April 13.—WESTERN JUNIORS: Bath. A.G.M. and Presidential Address.

April 15. — COMBUSTION ENGINEERING ASSOCIATION: Houldsworth School of Applied Science, The University, Leeds 2. 11 a.m.

April 15.—EASTERN G.C.C.: Watson House Centre, Townmead Road, Fulham, S.W.6. 11.30 a.m.

April 16.—INCORPORATED PLANT ENGINEERS, South Wales Branch: South Wales Engineers' Institute, Park Place, Cardiff. 'Gas in Industry.' 7.15 p.m.

April 16-17.—BRITISH COAL UTILISATION RESEARCH ASSOCIATION: Conference. Majestic Hotel, Harrogate.

April 17. — YORKSHIRE JUNIORS: Huddersfield. President's Day. Visit to Brook Motors.

GETTING THINGS DONE!

The Coke Oven Division of Woodall-Duckham has completed and put to work 9 New Installations during the last 2 years

AVENUE	**106 OVENS** *for The National Coal Board*
BECKTON IV	**30 OVENS** *for The North Thames Gas Board*
CARDIFF IV	**46 OVENS** *for Guest Keen Iron & Steel Co. Ltd.*
EBBW VALE III	**21 OVENS** *for Richard Thomas & Baldwins Ltd.*
EBBW VALE IV	**21 OVENS** *for Richard Thomas & Baldwins Ltd.*
IRLAM IV	**21 OVENS** *for Lancashire Steel Corporation Ltd.*
MONKTON II	**33 OVENS** *for The National Coal Board*
REDBOURN II	**19 OVENS** *for Richard Thomas & Baldwins Ltd.*
STANTON II	**44 OVENS** *for The Stanton Ironworks Co. Ltd.*

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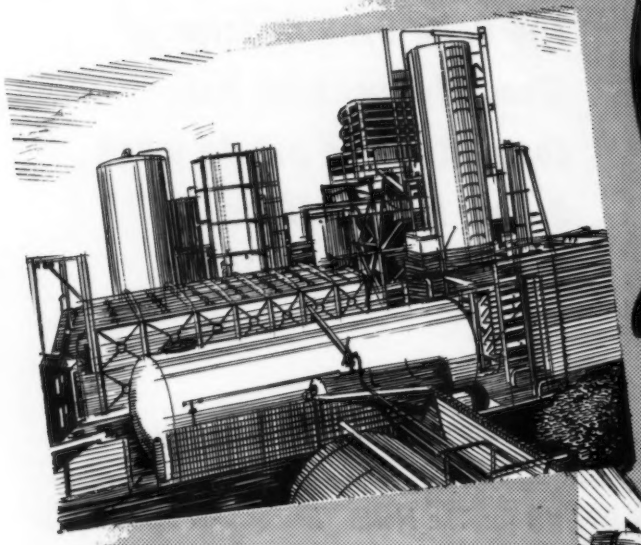

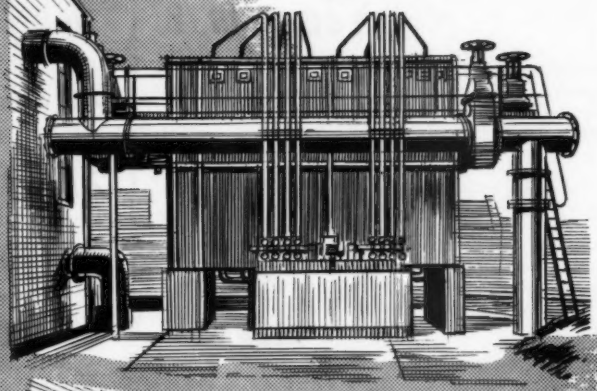

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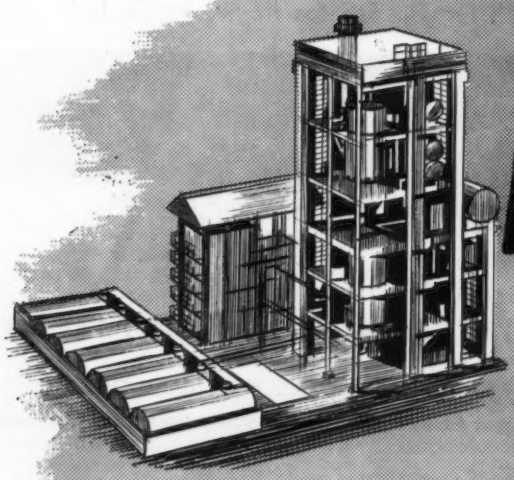

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Onia Gegi Plant at Carlisle

First Regenerative Plant in Great Britain is Put into Operation

THE Northern Gas Board have recently installed an Onia Gegi oil gasification plant at their Carlisle gasworks in the Cumberland Division.

This plant, which is unique in that it is the first fully regenerative plant which the contractors, Humphreys & Glasgow, Ltd., have built in Great Britain, was commissioned at the end of January and so it has run long enough to be able to show its possibilities.

The Onia Gegi system of oil gasification makes use of a fixed bed cyclic process and employs a catalyst whereby a mixture of atomised oil and steam are converted to a gas of similar calorific value and combustion characteristics to town gas. The 'blow' and the 'run' periods are employed as in the manufacture of carburetted water gas.

The process was originally developed in France, but further development by Gegi and Humphreys & Glasgow, Ltd., has made a commercial plant possible and has greatly increased the scope of hydrocarbons which can be successfully gasified to yield a gas suitable as town gas.

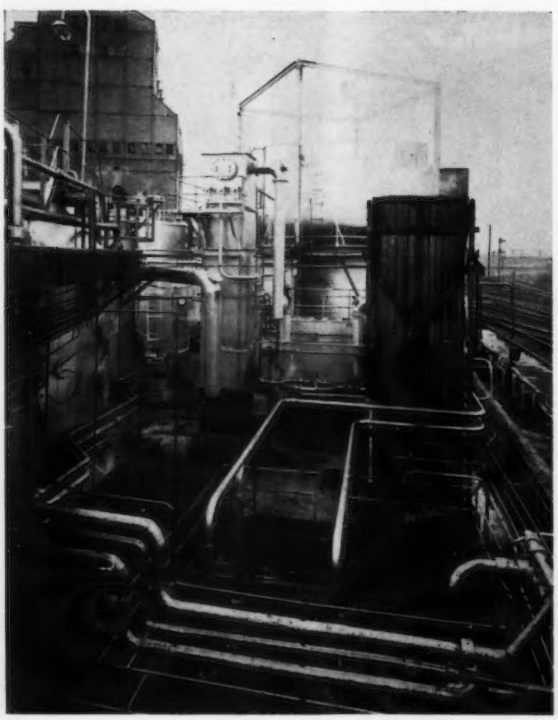
The diagram, Fig. 1, shows the two phases which are generally referred to as the 'blow' and the 'run' or more accurately, as shown, as the heating and gas-making phases. The heating phase involves the burning of oil at the base of the air/make gas regenerator, the flue gas from which, mixed with the preheated air from the regenerator enters the reactor which contains the catalyst. Here, any carbon deposited during the gas-making phase will be burned off by this preheated air and the temperature of the vessel raised to that required for gas making. The hot gases then pass to the steam/waste gas regenerator where the heat is absorbed before it passes to the stack. Both the regenerators are packed with checkers. During the gas-making phase, the steam enters the base of the steam regenerator where it is superheated to the required degree and after mixing with the oil which is admitted at the top, passes into the reactor vessel where the oil is gasified in the presence of the catalyst. The gas passes on to the second regenerator where it gives up its heat on its way through to the gas washer and the relief holder.

The capacity of the gas-making plant at Carlisle before the installation of the Onia Gegi plant was approximately 4.5 mill. cu.ft. per day, and consisted of 40 in. and 33 in. Glover-West continuous vertical retorts. The 33 in. retorts were originally constructed in 1922 and half of this bench is now being reconstructed as standard 33 in. retorts and should be completed in November, 1957.

The geographical position of Carlisle makes any further extensive integration either within its own Division or outside

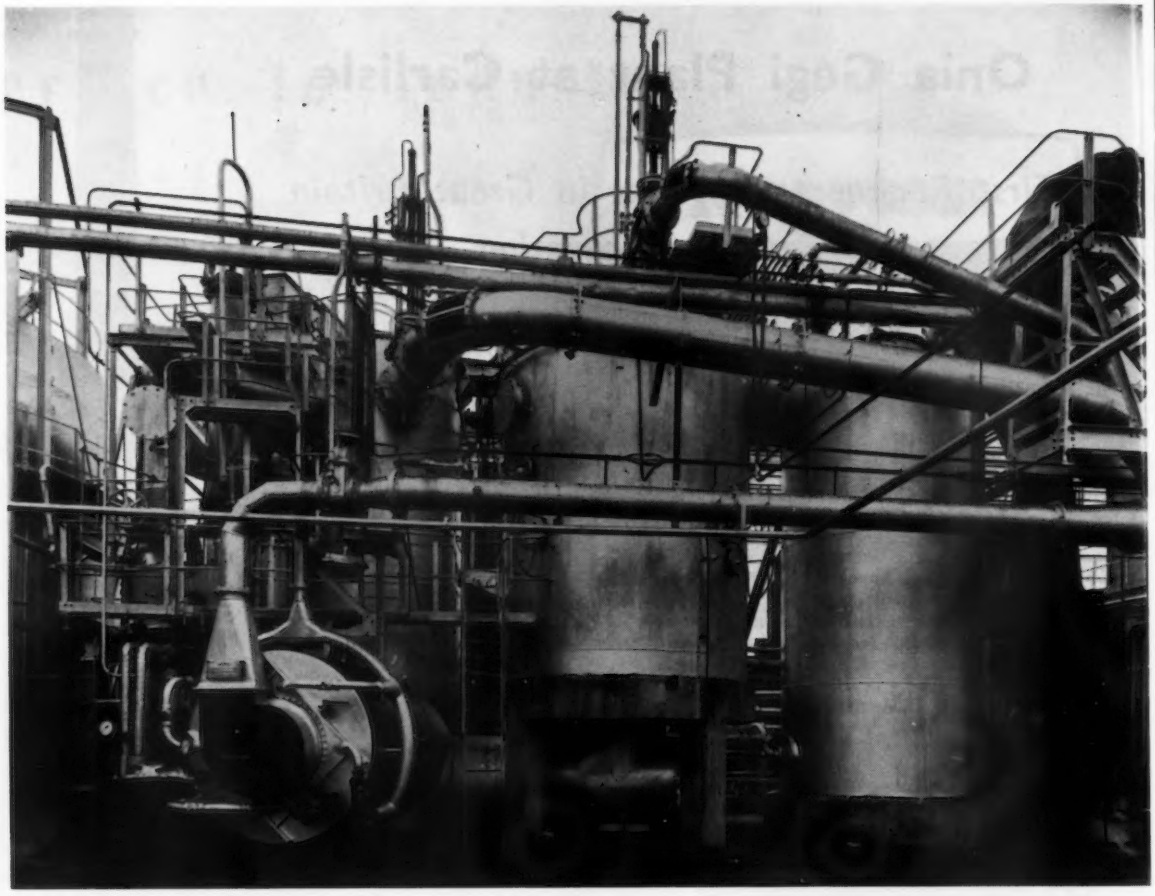
Described by C. J. P. de Winton, Technical Editor

Photographed by Stephen Tennant, A.R.P.S., Staff Photographer



Above: General view of the Onia Gegi plant showing the two regenerators either side of the reactor vessel, with the oil burner in the foreground and the chimney stack in the background.

Left: The ancillary plant behind the main Onia Gegi plant, showing the effluent settling tanks, gas washer, water cooler, and relief holder in the background.



A close-up view of the Onia Gegi plant. The arrangement of pipe work can be clearly seen and the pneumatically operated valves are shown at the top of the air/make gas regenerator and the reactor vessel.

it unlikely, though a main has been laid to Brampton, and Wigton is in progress of being connected, and eventually mains from Workington in West Cumberland will connect to the Carlisle works.

The expansion of gas supplies will, therefore, generally be limited to the immediate neighbourhood of Carlisle where industry is most conveniently placed for expanding its consumption of gas.

The consumption of coke in the Carlisle area is such that the Northern Gas Board has no difficulty in selling all that it wants to and so any increase in gas-making capacity should not rely on the manufacture of C.W.G. For this reason oil gasification was chosen as a means of supplementing coal gas supplies and providing peak load gas during the winter.

The Onia Gegi plant at Carlisle has a capacity of 1 mill. cu.ft. per day and uses '1,000 secs.' heavy oil with a specific gravity of .97. Oil is brought from Heysham by rail to the works and stored in a storage tank of 50,000 gal. capacity.

The main plant consists of three mild steel cylindrical vessels lined with fire brick and insulated successively by high temperature insulating brick, fossalsil brick and slag wool. This applies to the large diameter connections between the vessels. Oil is burnt in an Urquart burner and compressed air is supplied to this burner and the air to the air/gas regenerator, from electrical driven centrifugal blowers. A flame failure device is provided which will bring the plant back to its standby position if the oil burner should fail to light after the gas-making period.

The plant is controlled by an automatic operator which is installed in the control room in which are also housed the main electrical control panel and the instrument board. The automatic operator uses pneumatic power for the necessary control of the plant with the appropriate actuating cams similar to

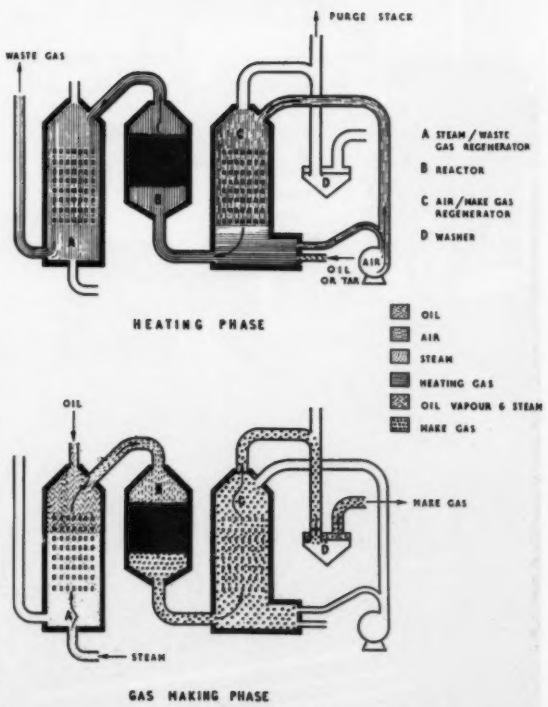


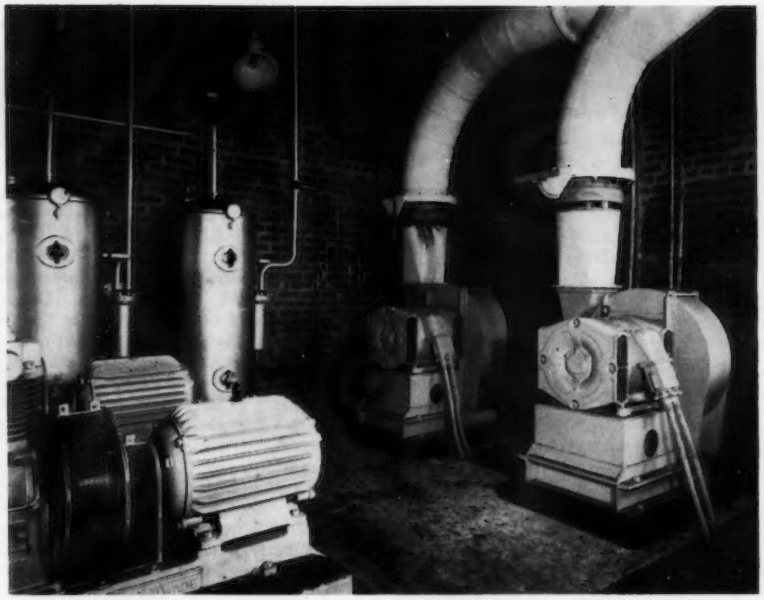
Fig. 1: Showing the flow of oil, steam and gases during heating and gas making phases.

those used for many years in the automatic operators of water gas plant. The moment of operation is indicated by the appearance or disappearance of a red indicator rod on the top of the operator casing and labelled appropriately. The compressed air for the operator is supplied by two Broomwade compressors driven by two 5 B.H.P. motors. One is in use and the other standby.

The plant is fitted with a very complete set of instruments mounted on a panel in the control room. By means of thermocouples situated at various parts of the plant and a six point electronic temperature recorder, temperatures throughout the plant are recorded. Differential air meters for the primary secondary and combustion air supplies are provided to enable the quantity consumed to be calculated. A hand-operated hydraulic system controls the amount of burner oil and make oil being consumed. The cycle lasts eight minutes and is divided up as follows: Blow 44%, make, 49%, oiling 38%, make purge 4% and blast purge 3%.

At the safe position all valves close except the stack valve which is opened.

All effluents are taken to a ground level tar separating tank. The tar is run off and the liquor is cooled and recirculated through the gas washer. The circulating water is in turn cooled in a timber cascade cooler. The tar is run into a special storage tank from which it can be fed to the oil burner and used in place of oil. This is the normal practice. The gas passes from the gas washer to a small relief holder of 10,000 cu.ft. capacity, from which it is fed into the main works gas stream.



The interior of the blower room in which are seen the air compressors for the pneumatic operator on the left, and the air blowers for the supply of air to the main plant on the right.

★

Interior of the control room. To the left is the instrument panel with the pneumatic operator standing in front of it. On the right is the electrical control panel and switchboard.

Industrial Gas Users Speak Their Mind at Midland Juniors Birmingham Forum

AT an industrial gas forum held by the Midland Junior Gas Association at Birmingham on March 5, the Chair was taken by the President, Mr. J. A. W. Stretton.

Mr. J. Ward, Humber, Ltd., said he had been asked to say what he thought about the service provided by the Industrial Department of the West Midlands Gas Board in Coventry.

He said that the way to new loads was the establishment of efficiency with existing loads. 'Help the customer to use less gas and he'll want to use more.'

Secondly, he expected the gas engineer to have or be able to call upon a wide fund of knowledge. 'I expect him to be something of a metallurgist, to be familiar with the requirements for annealing, tempering, carburising, hardening, etc., the application and drying of paint and enamel, the various processes in the foundry where gas is or can be used as a fuel, and many more.'

Mr. Ward added: 'From this broad background, and from the researches which are carried out by the gas board themselves, I expect the gas engineer, without, of course, betraying any confidences, to keep me posted on any new or particularly successful applications which may be of interest or value to my job.'

Design of New Plant

He thought it might be a good thing if the industrial department of the gas board were prepared to interest themselves directly in the design of the new plant. Frequently it happened that the persons influencing the purchase of new plant were either planning engineers or buyers, the one being primarily interested in whether the process would be successful, the other in who could quote the cheapest price.

Mr. Ward said: 'I should like to see the gas board prepared to study the detailed drawings submitted by the plant manufacturer and prepared to issue or withhold a certificate of gas worthiness. It could then be a condition of contract that such a certificate must be obtained.'

Mr. L. G. Leonard (Dowson Mason Company) presented the case of plant makers. He said that in recent years there had been an increasing co-operation, which he thought could still be further extended, between manufacturers and gas board officials, but it was no use shutting their eyes to differences in outlook. 'The manufacturer,' he said, 'is mainly concerned with marketing and making a profit from those articles or furnaces that he builds, while the gas board official is more concerned to have a satisfied gas consumer.' He added: 'I personally would like to see much more co-operation than exists at present, both on a national and on an individual level, and I suggest this could be achieved by a greater linking of technical information and the free giving of advice and help by both parties.'

The first requirement of a gas salesman was to sell gas and the second was to see that it was consumed economically in good equipment. He sometimes felt that salesmen would be better occupied selling gas than making up some specialised form of appliance or, alternatively, as so often happened, in making up some pet furnace or special gas burner which, although very admirable in itself, was time consuming and wasteful of effort.

It was often the easiest course to sell gas by getting the consumer to build his own plant. The effect of this was that the gas appliance was not quite as good in performance as that which would have been purchased from a recognised furnace builder, and frequently it was not as good in appearance. Mr. Leonard submitted that such instances were not desirable and should be discouraged by the gas industry but fortunately, since nationalisation, this type of occurrence had been getting less and less frequent.

He knew that the furnace industry was not always guiltless, and he could tell of quite a few instances where unwittingly they had not helped the gas salesmen, but those instances were usually through lack of foresight and lack of co-operation. Consequently, one could not escape the feeling that what was required was a sincere desire on both sides to help each other, rather than to be at loggerheads.

One of the finest schemes which had been put into operation was that of the young apprentice gas engineer or salesman spending three to six months in the works and offices of furnace companies. During their stay they formed friendships with the younger members of the staffs, which should prove beneficial to them throughout the whole of their working life as industrial gas engineers.

Mr. J. Price, Deputy Industrial Gas Officer, Warwickshire Division, West Midlands Gas Board, outlined the departmental organisation centred at Coventry. This Department operated within Warwickshire under the control of Mr. A. Allen, the Divisional General Manager. The layout indicated that the Industrial and Commercial Department had the staff to operate as a self-contained unit, with ease and flexibility. Certain features of this labour arrangement, in respect of craftsmen were unique, within the Board area at least, and certainly provided a method by which consumers could receive prompt and personal attention to any of their varied requirements.

Mr. W. H. Tarn (Industrial and Commercial Gas Engineer, Wales Gas Board) said his Board held the view that industrial gas engineers were specialists, whose experience and knowledge, built up over the years, should be available to all consumers. The Wales area could be divided roughly into three sections each corresponding to the Eastern, Western and North Wales grid areas. Each section was covered by a senior industrial gas engineer with assistants. The details of their organisation were given by the President, Mr. Stretton, in his presidential address.

Reports were submitted each month covering the work carried out and in consequence, Mr. Tarn said, he was able at headquarters to keep a check on the whole of the industrial business throughout the Board's area. With a scattered area such as theirs, difficulty would always be experienced with the question of travelling. The majority of their undertakings were widely separated. Most of them were not large enough to carry an industrial gas engineer, but they endeavoured to arrange their work so that isolated journeys were only made in special or urgent cases. What, asked Mr. Tarn, was their object? He said: 'We aim to serve industry by offering it a heat service at a reasonable cost. We have gas to sell. The Board's policy is to collect all coke-oven gas in the area and to distribute it. We believe it is in the national interest so to do.'

Co-operation of Manufacturers

Mr. Tarn said it was his belief that industry sought a heat service in its widest sense—and here he included the co-operation of all manufacturers. This brought him to an important point. Their industrial gas engineers must be experienced and well versed in the economics and application of all fuels, and must be prepared to give freely of their knowledge. Since nationalisation industrial gas had made rapid progress. He sometimes felt that their industry had become conditioned to the expansion of industrial gas and at last realised its contribution to industry. Therefore they could not stand still. They must continue their development.

There were still many fields of application that are as yet untapped. Let them take for instance the chemical industry and its need for accurate temperature controls over predetermined time cycles. Again, the high temperature processes dealing with components for aircraft and guided missiles.

'We have more than enough work in front of us,' he said, 'in continuing to improve the efficiency of existing plant and provided we maintain a first class service to industry I am confident that the future of industrial gas holds many opportunities for our industry.'

Mr. R. F. Hayman, Industrial Gas Officer, Gas Council, said the West Midlands Gas Board sold more gas to industry than any other Board, and a high proportion of its load was con-

(Continued on p. 51)

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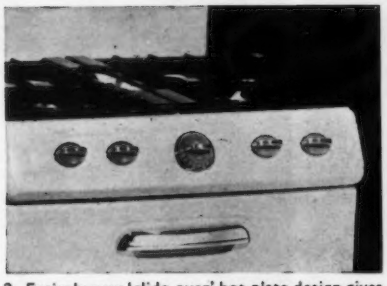
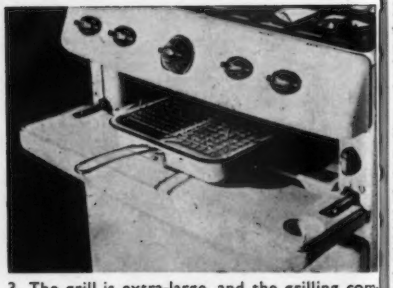
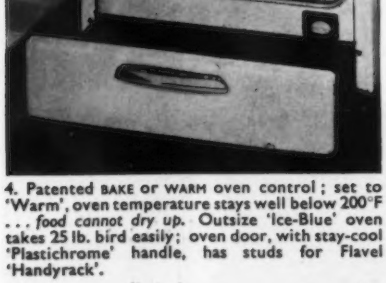


2. Entirely new 'glide-over' hot-plate design gives safe, non-spill support for even the smallest milk saucepans. Streamlined press-turn safety taps, with special LOW burning position, available in a choice of six colours, at no extra cost.



3. The grill is extra-large, and the grilling compartment has the new light-reflecting 'Ice-Blue' interior finish. The fall-door has been specially styled to give a smooth, absolutely level working surface when in the 'down' position.



4. Patented BAKE OR WARM oven control; set to 'Warm', oven temperature stays well below 200°F . . . *food cannot dry up.* Outsize 'Ice-Blue' oven takes 25 lb. bird easily; oven door, with stay-cool 'Plastichrome' handle, has studs for Flavel 'Handyrack'.

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From a paper to the Manchester District Junior Association of Gas Engineers on March 20.

The Centralised Testing of Coal and Coke

By A. GIBSON,

PRINCIPAL CHEMIST, COAL LABORATORY,
LIVERPOOL GROUP, NORTH WESTERN GAS BOARD.

THE Liverpool Group of the North Western Gas Board carbonised over 600,000 tons of coal during the year ended April, 1956, and this involved an expenditure of well over £3 mill. by the time the coal was delivered into the retorts. This coal is of the more expensive types and its price is dependent primarily on its calorific value which is, in turn, regulated by its inert content. Continuous testing to ensure that coals are in agreement with the Coal Board standards is more than justified, but such testing must be on scientific lines and in general, the methods used must follow those laid down in the appropriate British Standard Specifications which are accepted by all the fuel consuming industries. These standards are subject to revision from time to time and, in fact, those relating to the sampling and analysis of coal and coke are at present being revised.

The sale of coal by the National Coal Board is at the present time regulated by a number of factors one of which is the analysis and this has been so since the coal price structure was set out in detail in December, 1951. This was a great step forward and it means, of course, that should a coal change in quality appreciably and permanently over a period of time the price would be automatically adjusted. For this reason alone continuous testing by the producer and the consumer is essential and it is a cause of some satisfaction to us in the North Western Gas Board that agreement between us and the N.C.B. with regard to coal analysis is generally good.

It has always been a matter of some concern to the gas industry that its classical methods of carbonisation call for the more mature type of coals which are in demand for furnace coke manufacture and great efforts have been made to develop new methods which are not so discriminating in their demand for special coals. Some progress has been made along these lines in our own area and it seems probable that less mature bituminous coals may become more sought after in the quest for a smokeless manufactured fuel. Nevertheless coals of the meta lignitous type could only be used economically if the price structure allowed for their deficiencies in gas-making properties, as against the more widely used bituminous types. This price structure would need to make allowance for the additional carriage charges incurred with coals which contain high inerts.

Centralised *v.* On-the-spot Testing

It is of some interest here to discuss the relative merits of centralised as against on the spot testing. Generally speaking where results of any kind are required quickly, on the spot testing becomes essential, but it is usually more costly and quick results are expensive. On the other hand, where large numbers of tests are required and time is not vitally important, centralised testing is always more economic and satisfactory. It always has the advantage of standardised methods and apparatus and for this reason alone, results from year to year can be safely compared. On the other hand, it is very doubtful if, for example, coal analyses carried out on the spot say 20 years ago by half a dozen different laboratories can be relied upon or used for comparative purposes. Centralised testing also is in a much stronger position than localised testing when results have to be agreed with outside concerns. At the same time, there is some economy in apparatus and labour when the preparation of samples for the laboratory is under consideration.

The sampling of coal and coke would appear to be defined closely in B.S.S. 1017, but there are, in fact, a number of decisions which have to be made at the outset. The requirements of the station engineer or the person responsible for operating the carbonising plant will not necessarily be the same as those of the coal or coke officer. With coal, for example, there may be a demand in some circumstances for the testing of coal samples as the coal is elevated to the retort house and a good case may be made for this when a relatively few varieties of coal are being dealt with. On the other hand when as is nearly always the case nowadays, a large variety of coals may be dealt with in the course of a week, such testing can be very demanding and the results when obtained are of little value except to the plant operator. After a long experience of both methods and, at times, a combination of the two, it has been concluded that the only really satisfactory method is to sample individual types of coal. If this is done, the analysis of the mixture of coals elevated can always be computed, whereas the converse method of inferring the analysis of individual coals from the analysis of a mixture is similar to the process of unscrambling the egg and is virtually impossible. The only exception to the procedure is when a performance test on a particular carbonisation plant is in progress.

Frequency of Sampling

The frequency of sampling is not a matter covered by B.S.S. 1017, since with the sampling of any particular type and grade of coal the period of sampling is not defined specifically. It will depend upon the interpretation of the term 'consignment.' Even if a particular coal which was not subject to any trend during the period of analyses, were only sampled once every six months, eventually a reliable estimate of its analysis would be possible. The period over which the analyses were spread would, however, be inordinately long. On the other hand, where coal quality is liable to change over a period as short as a year fairly frequent sampling is essential. In considering the frequency of sampling the variability of the most variable constituent (usually ash in the case of coal) has to be taken into consideration. Each coal would have its own frequency but some simplification is allowable. In the case of the Liverpool Group and, in fact, the North Western Gas Board Area an arbitrary division into three classes was made, *i.e.*—A, B and C. In the 'A' class the coal would be sampled every 800 tons, in the 'B' class every 400 tons and in the 'C' class every 200 tons. This division allowed for the variability of the ash content of the coals and every 16,000 tons a summary of the results was made. The majority of coals in the Board's area fall into class 'B' being sampled every 400 tons and the results summarised every 40 analyses. In the case of new coals of which the variability is not known, they are initially considered to be in class 'C.' At the end of 80 analyses the results will indicate the class into which the coal should be placed to avoid taking of unnecessary samples. This method works well and its efficiency can be demonstrated by the process of duplicate sampling. It results in the greatest economy of effort to obtain trustworthy and reliable results which can form the basis for discussion of analyses.

The essence of any statistical scheme of the above nature is that all the samples shall be representative of the consignments and they should be without bias. This can only be achieved if the individual samples are taken as described in B.S.S. 1017. In order to avoid excessively large samples the

practical accuracy for commercial coals is accepted as ±1% in the ash content in 19 cases out of 20. The other constituents, being less variable, will have greater accuracy. A considerable amount of labour can be saved if automatic coal sampling can be instituted, but this is not always possible and depends on the layout of the plant. Almost all types of automatic samplers are applied to belt conveyors and some older works do not always have a convenient stage for automatic sampling. Again there are cases where sampling from wagons, although not recommended, is almost the only possible method and automatic sampling is out of the question. Where automatic sampling is installed on belt conveyors probably the best available type is that which pushes a plough across the belt at preset intervals and thereby takes a sample of the complete cross section of the coal stream. Such a device can readily be adjusted to meet the requirements of B.S.S. 1017. Great caution is needed with samplers which are affected by segregation on the belt. Attention should always be given to the enclosure of lubricated parts with such machines, since devices which are theoretically satisfactory may give a very poor performance in an atmosphere of coal dust and incur continuous maintenance charges. It has been our experience at Liverpool that conditions are only occasionally favourable to automatic sampling and even when installed they require the frequent attention of a skilled sampler to ensure they are operating to schedule.

Preparation of the Gross Sample for Analysis

When centralised testing is decided upon it is also essential to decide at what stage the gross samples shall be transmitted to the central testing laboratory. Crushing machinery is expensive and should be used to the best advantage. On the other hand, considerable charges can be incurred by transporting large samples of coal over even short distances. In the particular circumstances at Liverpool no one arrangement would have suited all works and it was decided to instal crushers at the large works to reduce the gross sample to ¼ in. size when the size reduction to about 10 lb., would not give any transport difficulties. The smaller works with less frequent sampling would forward the gross sample to the central laboratory in special containers for complete crushing and subdivision.

There is a wide choice of crushing machinery for the size reduction of coal and coke samples and this matter has been given some detailed consideration in the revision of B.S.S. 1017, part 2. In general it can be said that the size reduction of coal is a simple problem as compared with coke, with a few notable exceptions such as cannel coals and the like. In part 2 of B.S.S. 1017 the revision discusses the type of machinery for the primary size reduction of coke and, as would be expected, it comes out very heavily in favour of impact type crushers for coke such as jaw granulators or hand crushing on a manganese steel plate. Grinding or milling of any kind in cast iron machines at this stage is clearly undesirable, since the danger of sample contamination with iron is a very real one when a hard material such as coke is being dealt with. Many laboratories including some at Liverpool already possess crushing machinery of the rotary type or the high speed beater type and it is very far from the stage of replacement.

If, however, the crushing surfaces are allowed to wear badly the process becomes one of grinding rather than crushing and contamination of the sample may then become significant. Continuous vigilance is necessary in this connection and from time to time control tests should be made to establish whether any contamination is, in fact, taking place. A further rough check can be obtained by weighing the wearing parts of the machine from time to time and keeping a record of the weight of samples handled by it. It has been found at Liverpool that with care contamination with such machines is negligible.

Analytical Procedures

The analytical procedures adopted may be divided into two groups those covering quality and utilisation and those which give some insight into the structure of the fuel, *i.e.*—9, 10 and 11 in the following lists.

A COAL	B COKE
(1) Total moisture and proximate analysis	(1) Total moisture and proximate analysis
(2) Total sulphur	(2) Total sulphur
(3) Calorific value	(3) Calorific value
(4) Swelling number	(4) Fire test
(5) Gray-King assay	(5) Shatter test and bulk density
(6) Ash fusion	(6) Critical air blast
(7) Coking tests	(7) Volatile therms
(8) Ultimate analysis	(8) Screening
(9) Solvent extraction	(9) Special activity tests
(10) Petrological examination	(10) Microscopic examination

(A) COAL

(1) *Total moisture and proximate analysis:*—Analyses can be expressed on the 'air-dried' basis, the 'as received' basis and the 'pure coal' basis, and sometimes misunderstanding occurs as to the meaning of these terms.

The 'as received' (A.R.) basis, *i.e.*—the state in which the coal is received or used by the consumer, means that the analysis has been corrected back to the total moisture content present in the coal when sampled and is, in fact, the basis on which the coal is paid for. The total moisture content is inclusive of the free and inherent moisture, and may be determined by drying 1,000 gms. of coal, crushed below ⅛ in., in a suitable drying oven at a temperature of 105°C. until constant in weight. If very wet the coal is dried in air which removes the free moisture. After further reduction in size the residual or inherent moisture can then be removed by drying at 105°C. The moisture in lower rank coals may be obtained by distillation with toluene if there is a danger of oxidation due to prolonged exposure at the elevated temperature. It has been found that when handling relatively large numbers of samples it is more convenient to determine the Total Moisture in one operation unless the coal is visibly wet.

The 'air-dried' (A.D.) basis is that on which the proximate analysis is carried out. In this state the coal only contains its inherent or natural water, and therefore will remain in a fairly stable condition while the analysis is proceding.

The 'pure coal' basis or the 'mineral matter free' basis is simply a basis to which the analysis is corrected for means of comparison and classification and excludes all but the coal substance. A small correction for sulphur and ash is necessary to give the mineral matter assumed to be present in the original coal.

The proximate analysis is the most common form of analysis to which the coal is subjected, and is best regarded as the basic analysis and is presumably called proximate in the sense of incomplete.

The proximate analysis consists of the determination of the inherent moisture, volatile matter, ash and fixed carbon expressed as percentages, the latter being obtained by deducting the sum of the other three from 100.

As has been previously stated the proximate analysis of coal is carried out on the air-dried basis. The air-dried coal retains a certain amount of moisture dependent on its rank and on the humidity of the air to which it is exposed. It has been suggested that coal for analysis should be 'conditioned' in order to stabilise its moisture content before analysis. This can be done by exposing the sample in a humidity cabinet, and would mean that all inherent moisture figures determined, could be related to a common datum. For routine checking of coal, however, it would seem an unnecessary complication.

There are several methods suggested for the determination of the moisture content of the analysis sample ranging from distillation with toluene, drying in a minimum-space oven, drying in an atmosphere of nitrogen to prevent oxidation, to drying of the moisture in a stream of nitrogen and absorbing the water so evolved in a suitable drying agent.

The method of determining the volatile matter has varied over the years. There was a time in the not so distant past when the volatile matter was determined by heating the coal in a platinum crucible over a Bunsen flame, and later the platinum crucible was replaced by a silica crucible of the classical platinum shape. Today the volatile matter is determined by heating one gram of coal in an electric muffle furnace for a period of seven minutes at a temperature of 925 ± 25°C. The type of crucible now used is of entirely different shape, being straight sided and so lends itself to different ways of introducing them into the furnace. The British Standard recommends standing each crucible individually on an inverted gas mantle base. This means that only one crucible can be introduced at a time and placed on its base, and in practice it is found that in order to prevent the temperature of the furnace falling too low, due to the door being open, only two crucibles can be

inserted. The other method which is in use is the Sheffield pattern where four or six crucibles are suspended from a vitreosil bridge and so can be introduced in one operation. The danger here, however, is that the heavier charge may cool the furnace below its prescribed limits. From tests on both methods variations of the order of 0.3% were obtained, but the cost of the vitreosil bridges is fairly high as is their breakage rate.

The term volatile matter refers to gases evolved at the prescribed temperature, less the inherent moisture.

The determination of ash is not so simple a task as would at first glance appear. Chemical changes occur in the mineral components of the coal and under different conditions of ignition give different residues. For this reason it is essential to control the temperature gradient to which the coal is exposed. Furthermore, too great a velocity of air passing over the crucibles in the furnace may produce carry over of particles into the furnace flue. For these reasons two stage ignition in the same furnace is to be recommended.

Value Strictly Limited

The value of a proximate analysis is that it gives an indication of the quality of the coal, but of itself it does not give a definite answer to all utilisation problems, and its value is strictly limited.

(2) *Total Sulphur:*—The sulphur content of the coal is of importance in many processes. Normally sulphur occurs in coal in three forms and in nearly all cases it is regarded as an undesirable constituent whose calorific value can seldom be utilised. It occurs as:

(a) Inorganic sulphur, *i.e.*—sulphates of metals such as calcium sulphate,
(b) pyritic sulphur, *e.g.*—FeS_2,
(c) organic sulphur, *i.e.*—sulphur combined organically within the coal, and possibly present in the original vegetation. These forms of sulphur may be determined separately if required by chemical means, but it usually suffices to determine the total sulphur. The normal method of sulphur determination is Eschka's method wherein the coal is burned in intimate contact with sodium carbonate, the sulphur being recovered in the form of barium sulphate in the usual way.

(3) *Calorific Value:*—The calorific value as determined is the gross constant volume figure at a pressure above atmosphere. The test is carried out in a high pressure bomb of the Berthelot type with separate body, cap and union nut. The body and cap must be constructed of steel forgings resistant to intergranular corrosion, and capable of withstanding an internal pressure of 3,000 lb. per square inch, and should have a capacity of 250-350 mls. and should not weigh more than 3.25 Kg. The union nut may be either the same material as the body and cap or rolled aluminium bronze.

The method of tests is straightforward. A known weight of coal, either in powder of briquette form is burned in the bomb in an atmosphere of oxygen at a pressure of 25 atmospheres. The bomb is immersed in a weight of water sufficient to cover it, and the rise in temperature of that water due to heat liberated by combustion of the coal measured by means of a standardised Beckman thermometer or a certified narrow range thermometer. Briquetting is seldom necessary and considerably increases the time required for the test. Occasionally, however, one encounters a coal sample which seems to be thrown out of the crucible on firing and in such rare cases briquetting overcomes the difficulty.

In this test accuracy of a high degree is essential. The initial assessment of the water equivalent, and subsequent rechecks, must be very carefully carried out. The room in which the test is carried out must be draught free, and shielded from the rays of the sun, so as to avoid any large variation in temperature.

Corrections for sulphur and nitrogen are made in all cases of dispute, but for routine checking these corrections may be dispensed with. More recently bomb calorimeters of the isothermal pattern have become available, and in certain circumstances they may save considerable time, although it is doubtful if they lead to any appreciable gain in accuracy. Usually the calorific value is only accurate to four figures and the fifth figure is usually rounded off to zero.

In the central laboratory of the Liverpool Group, these three analyses—the proximate, sulphur determination and calorific value—are carried out by three girls working a rota system. The greatest bottleneck encountered in the carrying out of the analysis was in the large number of weighings required, but this has been overcome to a certain extent by the adoption of an Oertling 'release-O-matic' balance of a special pattern. This instrument has halved the time spent in weighing and the time saved is reflected in the ability of the operators to undertake other jobs. Further progress in reducing the tedium of weighing can be expected in the future.

(4) *Swelling number:*—In addition to the proximate analysis of a coal, it is a normal procedure to ascertain the swelling properties of the coal, and this test is regarded as a part of the proximate analyses. This operation entails the heating of a gram of coal in a shielded, closed crucible over a gas burner of the Teclu type. The resultant coke button is compared against standard outlines and given an arbitrary number. It is desirable to prepare standard buttons against which a comparison may be made. These standards are always available and remarkabliy good agreement between operators is obtained with this test. The swelling number should only be taken as an indicative test, not as a definite measure of how much a coal will swell on carbonising.

(5) *Gray King Assay:*—In the search for a satisfactory laboratory means of assaying coal for carbonisation purposes many methods have been tried. A few of these have stood the test of time, amongst which may be mentioned the JB/UAL assay, the Bauer assay, the U.S. Steel method, the B.M./A.G.A., the 1/1,000th ton plant, and of course, the Gray King assay. These tests vary considerably in the amount of coal used, and the importance of correct sampling is once again emphasised. At Liverpool the Gray King assay is carried out regularly.

The high temperature Gray King assay is not an analysis to be undertaken lightly. Very close control of time and temperature is necessary, and a constant check must be kept on the heat distribution within the furnaces.

Utmost Importance

The test itself consists of heating 20 gms. of coal in a transparent silica retort and passing the gases evolved through a 'cracking' zone, consisting of crushed silica brick, kept at a constant temperature of 800°C., condensing the ammoniacal liquors and tar in a condenser immersed in ice and collecting the gas in a gasholder. The method of heating the coal is of the utmost importance, in that the temperature must be raised from 300°C. to 900°C. in 2 hours exactly, *i.e.*—5° per minute.

From the assay we can obtain certain information:

(1) The amount of gas produced, its specific gravity, its chemical analysis and its calorific value.
(2) The type and weight of coke produced. The type is obtained by comparison against standards.
(3) The relative amounts of liquor and tar.

This assay is intended to give a rapid evaluation of coals, and by means of factors to correlate the yields obtained on assay with those from works practice. These factors depend on the type of plant and on the size and type of coal used.

(6) *Ash Fusion:*—A knowledge of the fusion point of coal ash is desirable to ascertain whether clinking troubles may arise in producers or in other processes. The melting point depends on the composition of the ash and is highest when the ash is composed mainly of alumina and silica.

(7) *Coking Tests:*—The use of small scale tests plants to assist in the efficient utilisation of a coal in the carbonising industry is, undoubtedly, one of the most valuable methods. In these plants conditions can be produced which are closely related to actual practice which is not possible in any laboratory assay. In the absence of such a small scale plant at Liverpool, 20-30 lb. of coal has been carbonised in horizontal retorts in order to assess the quality of the coke produced. The coal is placed in a series of metal boxes and pushed into the retort and carbonised for varying lengths of time. Using coals of different rank we are producing some interesting results on the behaviour of these coals on carbonising.

(8) *Ultimate Analysis:*—The ultimate analysis covers the determination of the individual elements present in the coal. The more important are carbon, hydrogen, oxygen, sulphur, nitrogen and chlorine. All these with the exception of oxygen are determined directly, but to date, there is no completely satisfactory method of determining the oxygen content directly and it is obtained by difference. In contrast to the proximate

analysis the determination of carbon, hydrogen, nitrogen, etc., is very precise and is only capable of one interpretation.

Carbon and hydrogen are determined by the combustion tube method which is in general use for the analysis of organic compounds. The gaseous products of combustion are fully oxidised by passing them through a zone of heated copper oxide, to carbon dioxide and water vapour. A further section of the tube contains lead chromate which removes the oxides of sulphur and a silver gauze to remove chlorine. The gases leaving the tube are passed through two weighed vessels containing respectively a dehydrating agent and caustic alkali. The method is simple, if somewhat tedious.

The determination of nitrogen normally takes some time using the long established micro method. Recently a semi-micro method has been developed which greatly reduces the time required for the determination to be carried out.

The value of an ultimate analysis is appreciated in combustion problems and where coal classification is required. The nitrogen determination, whilst not a routine test, is of interest in connection with ammonia recovery. The apparatus for the determination of carbon and hydrogen can be turned to good account in the evaluation of gas oils.

(9) *Solvent Extraction:*—Further investigations into the problem of the constitution of coal have been conducted along two main lines:

(1) Separation by the action of solvents and subsequent examination of the residues.

(2) Degradation of coal by chemical reagents, followed by examination of the products.

These are both completely different approaches to the problem of elucidating the structure of coal as compared with the effect of heat. Large numbers of organic solvents have been tried, but the results have been difficult to interpret. Only extractions with benzene, pyridine, and ethylene diamine have been pursued to any great length and the one important point that emerges is that at some point in the extraction the coking power of the coal is destroyed. Chemical degradation has also provided further information about the constitution of coal, but very few definite conclusions have emerged. Of great interest at the present time are the researches of Dryden in this country and Van Krevelen in Holland. It is not impossible that solvent extraction of the coking constituent of coal might at some future date have a commercial application.

(10) *Petrological Examination:*—This method of investigation consists of the microscopic examination of the various types of coal. Test pieces, either block or their transparent sections of the coal, are subjected to microscopic examination and their structure established. By this means, the four rock types, viz., vitrain, fusain, clarain and durain, may be subdivided into their constituents or macerals, namely, vitrinite, collinite, xylinite, etc.

This method will sometimes show the original vegetable matter from which the coal was formed and is a means of classifying coal, but does not give us any help in the utilisation of the coal, unless we can understand the functions of the different constituents and how they react to heat.

The four main rock types may be recognised fairly easily by careful visual examination of pieces of coal and it is always worth while to keep a watchful eye on coal consignments with this in mind. Visual examination will also give considerable information regarding impurities such as sulphides, sulphates and clays.

(B) COKE

(1) *Total Moisture and Proximate Analysis:*—In general the proximate analysis of coke follows similar lines to those for coal but there are a few items worthy of comment. The determination of total moisture can be carried out at a higher temperature (up to 200°C) and no special precautions against oxidation are necessary. For this reason a large number of air changes giving rapid drying are allowable and the test may be completed in one hour at 200°C. At least 2,000 grammes of ½ in. coke should be taken for the moisture determination and where larger numbers of samples are dealt with, an industrial type thermostatically controlled gas oven is a very worth while investment.

In the determination of volatile matter a drop of toluene should be added to the crucible before placing in the furnace to purge air from the crucible and prevent oxidation. Great care is necessary to ensure the correct temperature conditions.

(2) *Total Sulphur:*—This is exactly as for coal using the Eschka method.

(3) *Calorific Value:*—The determination of the calorific value of coke is not required very frequently since this figure can be calculated reasonably closely from the proximate analysis. When it is necessary, however, coke gives some difficulty with ignition. This can be overcome by mixing the coke with a known weight of benzoic acid due care being taken to keep within the heat capacity of the bomb.

(4) *Fire Test:*—In an attempt to define a good quality coke many tests have been evolved, but from a practical standpoint the use of a standard fire, e.g., 16 in. Fulham grate, affords the best basis on which to assess coke performance in the open fire. The standard test involves the ignition and combustion of a set volume of coke, with subsequent recharges to the original datum line at specified time intervals.

Size Effect on Radiation

At Liverpool a large number of investigations into coke quality have been carried through, using the standard fire test. In addition to the standard test, experiments have been made with recharging at different radiation output levels as opposed to specified time intervals. Tests on close screened cokes have also been tried, that is to say, a normal domestic coke sample has been subdivided into ¼ in. limit fractions and tested in order to gain some idea of size effect on radiation.

The means of assessing a coke suitable for combustion in an open fire vary. It has been suggested that ignition by a minimum amount of gas is one means, that the time required for a fire to give a radiation of 5,000 B.Th.U. another, a third that the peak radiation after the second recharge is a measure of its all round efficiency. These means of assessment are all open to criticism.

It does not follow that because a coke will ignite with a minimum of gas that the resultant heat output from the fire will be high. There are other factors to be considered. The time required to give a radiation of 5,000 B.Th.U. is dependent on the particles size of the coke and the distribution of the various sized particles. The peak radiation, especially when measured on a fire which has been refuelled on a time basis, is not a true reflection of a coke's performance.

Some cokes on ignition will give a radiation of 5,000 B.Th.U. in a reasonable time yet on the second recharge give a very low radiation. Conversely, a coke which may require a longer time to reach a radiation of 5,000 B.Th.U. may have a higher output on its final charge. Effect such as this can often be traced to the amount or nature of the ash.

One point which is of interest is the time taken by a fire to recover a heat output of 5,000 B.Th.U. on recharging at various heat output levels, but taken all in all there is no one factor which can be taken as a measure of coke performance. Of all the means available, perhaps, the determination of the minimum gas for ignition is the most useful.

(5) *Shatter Test and Bulk Density:*—These tests are purely physical. The bulk density is generally useful for transport purposes but it is also loosely related to the combustibility of the coke as has been previously noted by a number of workers.

The shatter test entails the dropping of 50 lb. hand selected coke from a metal box of approved pattern at a height of 6 ft. on to a metal plate. This procedure is repeated a specified number of times and the resultant coke screened at 2 in., 1½ in., etc., the result being expressed as a percentage on each size as the 'shatter index' on that particular size. The test is of particular value for export consignments and is useful for investigations into breeze formation.

(6) *Critical Air Blast Value (C.A.B.):*—This test was devised in the laboratory of the Northern Coke Research Committee and has been modified from time to time.

The C.A.B. is defined as 'the minimum air blast rate, measured in cu.ft. per minute, at 60°F. and 30 in. mercury pressure; which will maintain combustion in a fully ignited bed of coke 40 mm. in diameter and not less than 25 mm. deep, for a period of not less than 20 minutes.' Combustion is judged to be maintained if, after increasing the blast rate to 0.150 cu.ft. per minute, a visible glow appears within 20 minutes.

A few observations on the test are desirable. The apparatus itself tends to take up a great deal of bench space and at Liverpool we have streamlined the layout somewhat, and enclosed the whole apparatus within a wooden framework.

This has resulted in a saving of valuable bench space, and greatly increased the ease of handling.

Adherence to the limits and conditions imposed by the standard are essential if reproducible results are to be obtained. The dimensions of the tube, distance of coke surface from heater, density of the charge, the screening of the coke between the 14 and 25 B.S. mesh and the current applied to the heater all have an appreciable effect. The method of preparation of the sample must be carefully controlled to ensure that the selected size fraction is representative, but in the best circumstances it is almost impossible to guarantee the fraction as being fully representative of the original coke substance. It does, however, provide some basis for comparison.

No Account of Size or Moisture

As a measure of reactivity it is indicative but not absolute. It bears little or no relationship with the actual performance of a coke on an open fire, although in some quarters it has been regarded as an accurate measure of coke quality. It is limited in its value, and should be treated with caution when used as a basis for prediction. For example, it can take no account of size or moisture content and this is another reason for not ascribing undue importance to the results obtained.

(7) *Volatile Therms:*—This test is an attempt to assess the thermal value of the residual gas content of coke which consists mainly of oxides of carbon and hydrogen. The gas is drawn off under vacuum from the coke which is heated to 1,100°C., after previous removal of any occluded gases. The combustible gases remaining are assessed as carbon monoxide and hydrogen. There are indications that this test, with modifications, could be of value as a measure of coke combustibility in the same way that the C.A.B. is. It would seem, however, that this is so only in special circumstances, and it is doubtful if small variations in volatile therm content around 3 therms per ton have any significance.

(8) *Screening or Size Analysis:*—This test is probably the most important single test of coke quality with the possible exception of moisture content and it is probably that which gives rise to most disagreement. The size analysis is carried out according to B.S.S. 2074. As a general rule gas coke is not a particular robust material and shutter indices in excess of 60% are unusual. Careless handling may increase the amount of small material very considerably and speaking generally this applies more particularly to the more reactive cokes. Even the handling of cokes on and off lorries can cause considerable breakage. For example, a sack of coke was screened true to size 1 in. by 2 in. and was then taken on and off a lorry three times without any special care. This resulted in the production of between four and 10% of material below 1 in. in size. It is due to considerations such as these that the size analysis of coke in the Liverpool Group is normally carried out by the samplers at the individual works and the results are returned weekly to the central laboratory. This system works well, but it is certain that the coke as screened on the works will be, on many occasions, appreciably truer to size than that in the consumer's storage. This is a strong argument in favour of producing a coke which is better in size analysis than that laid down by the Gas Council Coke Committee.

(9) *Test of Activity:*—Various methods have been used from time to time to obtain the activity of coke. The activity or reactivity is used to denote the ease with which it will interact with a number of substances such as oxygen or air, carbon dioxide or steam. The practical uses of such as determination appear to be obvious, but the only tests which have survived are those concerning the reaction with air. The main reason for this is that when coke is used in industry activity is not nearly so important as it is when used by the domestic consumer. In industry a poor reactivity can nearly always be offset by increasing the oxygen concentration or by adjusting plant conditions. There is also some truth in the rather loose statement that at high temperatures activities become evened out and they are of less importance. When coke is used in the home, however, there is little, if any, control over the conditions with the possible exception of closed appliances of some types.

The activity of coke towards oxygen as supplied by potassium permanganate was, at one time, favoured but differentiation in this way is not easy and the method is no longer in use. The oxidation with chromic acid and measurement of the production of carbon dioxide will enable various forms of coke and carbon to be identified, but the method is seldom used for gas cokes. At one time, tests for measuring the rate of reduction of carbon dioxide and steam by coke were developed but they were used for studying the kinetics of the reactions involved rather than as a control test for the coke.

(10) *Microscopic Examination:*—Microscopic examination of coke is not, perhaps, as fruitful as for coal, but it does give a good assessment of porosity, and from the general appearance of the sample a good idea of its reactivity or combustibility can be obtained. Indeed, with experience, a very good guess as to combustibility can be made by a visual inspection without recourse to the microscope.

5. Miscellaneous Tests.—The isolation of 'flying' shale from coke and the identification of the coals from which it is derived is another attempt to improve the quality of coke. A method has been devised which has been found to be fairly reliable and has enabled certain coals to be black listed. The method is based on the separation from the coal of the material which sinks at a specific gravity of 1.6. This material is then carbonised, quenched and allowed to cool and dry. The resulting material is then rapidly heated in a muffle furnace and the evidence of explosions noted.

From time to time special applications call for determinations of particular elements in coal or coke and it is likely that these kinds of analyses will increase as greater use is made of some of the rarer constituents. Chlorine in coal which is determined by a variation of the Eschka method is sometimes required for reasons connected with refractory attack by chlorides and for the same reason the alkali metal content is occasionally of interest. Phosphorus and arsenic are elements which occur in coke in small amounts and may be of interest from the utilisation point of view. In both cases the determination is simple and is fully described in the British Standard. Carbon dioxide in coal is sometimes required when large amounts of carbonate are suspected and a gasometric method is by far the best. The Bone and Wheeler apparatus may be used for this purpose. Full analysis of ash is seldom required and this kind of determination is usually passed to the analytical section.

A card index for all coals and cokes is kept up to date in the laboratory and in addition a works coal report book, of the loose leaf pattern, is kept in which is shown the analysis of every coal received in the group, together with other relevant information. There are two such books for each works, one being in possession of the station engineer, while the other is brought up to date by the coal laboratory. These books are exchanged monthly. They give the station engineer a complete picture of all coals received and show how the latest analysis compares with the standard analysis; the rate at which the coal is being sampled on each works, that is the number of samples per number of tons received; any special tests, that is Gray-King assay, ash fusion, etc. The analyses are averaged quarterly so that any deterioration, however slight, can be noted and acted upon. The sampling classification, i.e., A, B or C, rank of coal and price reference are also shown.

Cokes are reported to the works bi-weekly or on request by phone. A summary of all cokes produced is made quarterly giving details of screening, moisture, ash, fire test, etc. Tests for domestic coke quality are passed to the Board weekly as completed. In addition the Board is kept fully informed of all coal analyses by means of a weekly abstract.

DISCUSSION

Mr. T. Nicklin, after commenting favourably on the value of the paper, said at the advent of nationalisation a lot of tests were made at laboratories. Group testing was carried out in the centralised points at Manchester, Liverpool and other places with a view to having a greater efficiency in coal and coke. He had been deeply impressed by the great amount of care taken, and the attention given to detail and preparation to secure results. He was gratified to listen to a paper showing how those tests were made and the results obtained. Throughout the paper he had not seen any reference to testing the accuracy of the operator and the instruments.

He felt there was need for periodic checks of both by means of standard samples.

Mr. Gibson said checking of instruments was very important. Calorimeters should be checked regularly. As to operators if they were suspicious of the results obtained they passed the

matter over to other operators and, if they found that both sets of operators got the same results, then it was the sample that was wrong and not the operator.

Mr. D. W. Kay said the frequency of testing depended on when the answers were wanted. There were times when they could not get the answers quickly. Taking the proximate analysis of coal this was very much like baking: Two persons might have different results which, in baking, a married man well knew!

Mr. R. J. Bramhall, of Rochdale, said as Mr. Gibson had rightly stressed the need for accurate sampling was paramount. However well a laboratory was equipped, poth in staff and apparatus, and however accurate were the determinations, the overall value of the results was no greater than the accuracy of the sampling and treatment of the gross sample up to the stage of the laboratory testing sample, and results could be very misleading. Therefore it was important that there should be properly trained samplers at the various works who would see that the sample was properly taken and packed and promptly sent off to the laboratory for analysis, and not forgetting to affix a legible label to the container. Centralised testing of coal and coke had its advantages and disadvantages and the decision whether or not to completely centralise should depend upon the set-up of the group.

With regard to the Central Lancashire Group that consisted of eight producing stations, three being fairly large and conveniently positioned in the area of the group. Those three works originally possessed full equipment and carried out proximate analyses, calorific values, swelling numbers and sulphur determinations on coal and coke, and it was decided to continue the practice. The equipment had been modernised and Stanton Omniweight balances had been installed which had speeded up the weighing without impairing accuracy. The works shared the analysis of the coals and coke in the group and in that way the distance between sending and testing stations was kept at a minimum and the samples were tested immediately. It must be remembered that those laboratories were not solely on coal and coke analyses but carried out the general testing work as well. They found this system had great flexibility and it appeared that more interest was taken in the work as the testing stations were sampling and testing their own coal and coke samples as well as testing the smaller number of samples obtained from smaller works. From time to time the accuracy of testing was checked by means of master samples sent to each testing station. Rochdale laboratory was equipped with coal assay plant carbonising $\frac{1}{1000}$ ton coal and complete with Boys calorimeter. It was filled up for quality tests of domestic coke and special work, and statistical surveys were carried out by the Rochdale staff.

Others who contributed to the discussion were Mr. N. Olsen, Southport; Mr. D. Benson, Manchester; Mr. R. Redman, and Mr. N. Hare, Board H.Q.

Thanks were expressed to Mr. Gibson by **Mr. C. W. Hemmingway,** Liverpool, and **Mr. J. K. Lord,** Senior Vice-President. Mr. Lord said they were now reaping the benefit of the development of the Wavertree laboratory.

The meeting expressed regret at the absence of Mr. T. W. Pickthall, Secretary, owing to indisposition.

Technical State Scholarships

CHANGES in the arrangements for the award of technical state scholarships are announced by the Ministry of Education. This year the number of scholarships to be awarded will be increased from 150 to 225. In 1958 applications will be considered only from candidates who, for the two previous years, have been engaged in part-time study at establishments for further education—except that students following national diploma courses will also be eligible; and from students who have not proceeded beyond ordinary national certificate level, or A.1 level in higher national certificate courses, or corresponding levels in other types of course.

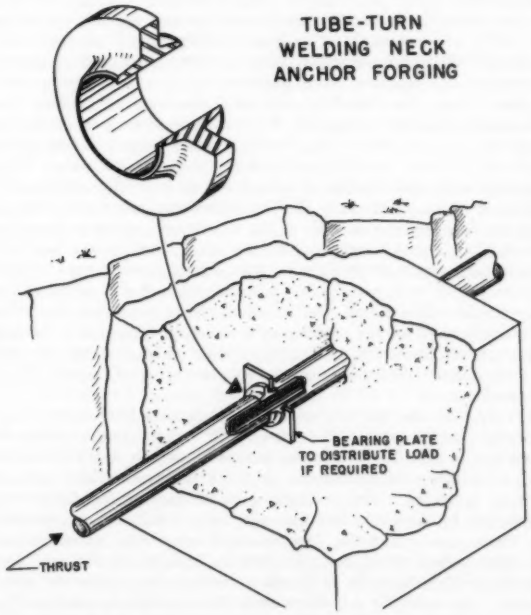
The effect of these changes will be to exclude from the scheme *in 1958 and later years* two categories of students hitherto eligible—those who have followed full-time courses leading to G.C.E. (advanced level)—in future such students will be expected to apply for ordinary state scholarships and not technical state scholarships; and students who have obtained higher national certificates.

A welding neck anchor forging is seen being installed on a 30-in. high-pressure gas pipeline in Louisiana. Later, the forging was imbedded in concrete to give the pipeline stability in a section that otherwise might have dangerous movement under operating conditions.

Pipeline Anchor

THE problem of satisfactorily anchoring high-pressure gas pipelines, particularly at compressor stations, river-crossings and adjacent to valve and meter settings, is reported to be more adequately solved with the recent introduction of an improved welding neck anchor forging, by an American manufacturer.

The forging is a double-hubbed flange, with no bolt holes, which may use a supplementary bearing plate to distribute the load imposed by the thrust. The hubs are of the straight



taper type recently adopted for large-diameter pipeline flanges. They are butt-welded to pipe that is to be held immobile and the assembly is buried in reinforced concrete blocks of suitable dimensions.

Any of the materials used for flanges may be used for the anchor forging. It is manufactured to meet specific installation requirements, in sizes to match any pipe dimensions and the usual range of pipeline pressures. Flange material with 35,000 psi minimum yield strength may be welded to pipe with yields as high as 52,000 psi, without overstressing.

Testing Gas Meters with Vacuum

THE process of proving gas meters with bell provers under slight vacuum, or negative pressure, instead of a positive pressure has been used by various groups for many years. Recently, with the advent of open-top tin meters and welded meters, this method of proving has been more widely used. It has the advantage of permitting exposure to tangent linkage and valves, thereby lending itself to co-ordinated meter adjustment with mechanical or electronic devices.

There is no fundamental flaw in the process, Mr. Hilding V. Beck, Chief Engineer, American Meter Company, told a conference of the operating section, American Gas Association. Its only requirement is that meter proofs are adjusted to the customary basis: Measuring displaced volume at the inlet instead of the outlet pressure. Definite adjustment to the meter proof can be made, depending upon the customary prover pressure.

The practical advantages of this testing method, Mr. Beck said, would seem to justify its more general consideration as a standard procedure.

Meter Proof

Since atmospheric pressure corresponds to about 400 in. of water, each in. of pressure drop will allow air to expand by 0.25%. A cu.ft. of air from a bell prover loaded to 1 in. of water will expand to 1.0025 cu.ft. when discharged to atmosphere. Similarly, 1 cu.ft. of atmospheric air will expand to 1.0025 cu.ft. if drawn into a bell prover which maintains 1 in. of negative water pressure, or vacuum. For convenience, it has been customary to measure conditions existing at the meter inlet. Also, hose and prover dry-well are sufficiently large to justify neglecting any pressure drop from bell to meter inlet. The volume displaced by the bell, therefore, is considered as the proper amount which the meter should indicate for establishing the meter proof.

If the meter received 1 cu.ft. of air directly from atmosphere, without restriction, and if its proof were 100%, the prover bell at 1 in. vacuum would indicate a volume of 1.0025, or an uncorrected proof of 0.25% slower than correct.

The correct proof, expressed as a percentage, would be: Indicated proof multiplied by $(100.0-0.25x)$, where x = prover vacuum in inches of water. In this method of proving, any restriction to establish a 'check' or 'capacity' rate is installed between the meter outlet and the inlet to the prover. Correct proof, for practical purposes, can be obtained by subtracting 0.25% from indicated proof for each inch of prover pressure below atmospheric pressure. This straight-forward analysis has been corroborated by numerous tests in which meters have been proved by both methods and the resulting proofs compared.

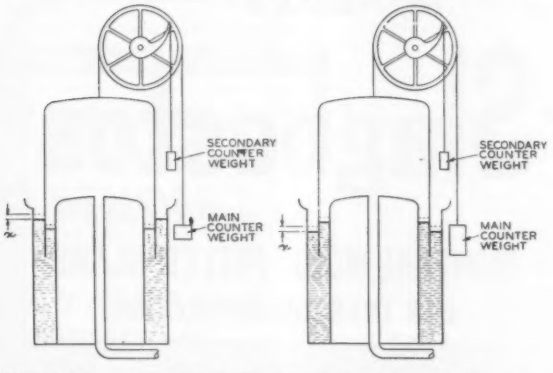


Illustration shows, left, bell provers testing under the more conventional practice with a positive pressure, and, right, with a vacuum. The differences in sealing fluid levels in the two methods illustrate the description of operations in the article.

Might Seem Awkward

Some manual operations in proving meters under vacuum are different and initially might seem awkward to operators experienced in the more conventional method. However, all operations and common meter tests can be performed satisfactorily by this alternative method.

The 'high' pressure openings into the differential draught gauge and prover gauge are open to atmosphere while the 'low' pressure openings are connected at the customary points in the test apparatus. Hose and connections are checked for leaks in the usual manner.

No Positive Pressure

The only difference is that the isolated zone, between meter and prover valve, must hold a slight vacuum instead of a slight positive pressure. The meter, connections and hose are usually tested simultaneously by lifting the short flag arms from the tangent wrist. This 'one points' the meter and verifies the ability to hold a vacuum in the trapped volume formed by meter and prover hose.

A prover 'bottled' at zero-pressure is correct for measurement at positive pressure. If the sealing fluid levels stay in the cylindrical inner and outer annular spaces, the prover will read correctly. The secondary counter-weight on the cycloid arm will correct for the effect of buoyancy in either case.

In both cases, the same secondary weight is suspended from the cycloid arm to offset changes in buoyancy corresponding to various degrees of submergence of the bell. Calibration by taking actual physical dimensions of components and sealing fluid levels yields an identical calibration for either pressure or vacuum proving.

One major precaution to be exercised in vacuum-proving concerns the sealing fluid level in the inner annular space. This inner fluid level is higher than the outer level. Too much sealing liquid would permit the inner level to rise above the top of the cylindrical section of the dry-well which forms the inner annular space. Resulting improper division of inside and outside increments of displaced fluid volumes will cause a slight error in the displacement from the bell. Under extreme conditions of excess sealing fluid, it could also cause fluid to be drawn into the dry-well, creating a partial trap at the low point in the flow channel and restricting free flow of air from meter to prover.

None of the precautions on limitations, Mr. Beck emphasised, prevent satisfactory use of displacement bell provers in testing meters under vacuum.

INDUSTRIAL GAS USERS SPEAK THEIR MIND

CONTINUED FROM P. 40

cerned with two most important operations, metal working and ceramics. He said Mr. Ward had asked for more regular inspection of equipments and had expressed the hope that industrial gas engineers would in future be able to deal with a wide range of problems, and have knowledge of all related subjects, for instance, metallurgy. What he was asking for really was that industrial gas engineers should be fuel technologists—many already were and probably, through training, all would be in the future.

Mr. Leonard had set a very good example as one of the manufacturers who had admitted members of the gas industry to his works for substantial periods. This form of training was most valuable and in association with other full-scale activities, for instance, sandwich course schemes at selected colleges, would in a year or so begin to produce trained men of the calibre required to take their place quickly in this complex field of fuel technology.

Much to Be Done

Mr. Leonard had asked for more co-operation between the manufacturers and the gas industry, and Mr. Hayman said that he had been working steadily for this, and he stressed the value of the co-operation received from such makers as Mr. Leonard, who was accessible and with whom it was always possible to discuss problems. It was not always possible to discuss problems with all manufacturers, and much remained to be done.

Gunite

One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking

Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have exceptional value.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

For lining coal bunkers and steel chimneys it possesses great resistance to corrosion and protects steel-work from the abrasive action of coal or coke.

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OLD-ESTABLISHED Birmingham Manufacturers require FIVE ENERGETIC AGENTS already calling on undermentioned Gas Boards to represent them on commission only basis for sale of all types Brasswork. Write fully, stating age, Agencies held and duration of same:—

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North Eastern.
North Western.
Wales.
South Western.

No. 320, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

BOOKS

WANTED: Copy of "RETORT HOUSE TECHNICAL CONTROL," by Myhill, published by Walter King—any condition. William Coward & Co., Ltd., 3, St. James Square, S.W.1.

APPOINTMENTS VACANT

SCOTTISH GAS BOARD

DUMFRIES DISTRICT

APPLICATIONS are invited for the post of TECHNICAL ASSISTANT in Dumfries District Undertaking.

Applicants should possess the Higher Grade Certificate of the Institution of Gas Engineers or an equivalent qualification, and should have experience in the operation, maintenance and layout of Gas Works Plant and Distribution Systems. A knowledge of the operation of Continuous Vertical Retorts and Carburetter Water Gas Plant is essential.

The salary applicable to the post will be within A.P.T. Grade 7 (£670 × £20 × £750) of the National Salary Scales for Gas Staffs. The position is pensionable and the successful applicant will require to pass a medical examination.

Applications, stating age, and giving particulars of education, training, experience and qualifications, together with the names of two referees, should be addressed to the undersigned to arrive not later than April 19, 1957.

S. C. JOHNSTONE,
Sub Group Manager.

Gas Works,
Cumberland Street,
Dumfries.

March 25, 1957.

SCOTTISH GAS BOARD

CHIEF ENGINEER'S DEPARTMENT

APPLICATIONS are invited for the following appointments in the Chief Engineer's Department at the Headquarters of the Board in Edinburgh:

1. TECHNICAL ASSISTANT (Production):
Applicants should be corporate members of the Institution of Gas Engineers and must have experience in the operation and control of all types of gasworks plant. The successful candidate will be required to assist the Department in all matters relating to gas production including the examination of operating results and the development of new projects.

2. TECHNICAL ASSISTANT (Distribution):
Applicants should be corporate members of the Institution of Gas Engineers and must have had wide practical experience of all aspects of gas distribution, including the design and operation of high and low pressure systems, scheduling and estimating of new schemes, and progressing main and service laying work.

The successful candidate will be required to assist the Distributing Engineer in all matters relating to gas distribution and integration schemes.

3. JUNIOR TECHNICAL ASSISTANT (Production):
Applicants should have qualified in Part I of the Associate Membership of the Institution of Gas Engineers or should possess an equivalent qualification. The successful candidate will be required to assist in matters relating to all aspects of gas production. This post offers an excellent opportunity for a young man engaged in a course of study leading to Associate Membership of the Institution of Gas Engineers to widen his experience in gas production.

The salary for the Technical Assistants (Production and Distribution) will be within Grades A.P.T. 10/11 and for the Junior Technical Assistant (Production) within Grades A.P.T. 5/7 with placing according to qualifications and experience.

The posts are pensionable and the successful applicants will be required to pass a medical examination.

Applications stating age, and giving details of education, training, qualifications and experience, together with the names of two referees, should be sent to the undersigned within 14 days of the appearance of this advertisement.

A. T. HERD,
Secretary.

26, Drumsheugh Gardens,
Edinburgh, 3.

March 22, 1957.

SCOTTISH GAS BOARD

CENTRAL DIVISION

APPLICATIONS are invited for the following appointments on the staff of the General Manager at the Headquarters of the Central Division of the Board:

1. DIVISIONAL SERVICE AND SALES MANAGER:
The successful candidate will be responsible to the General Manager for consumer service, the managing of showrooms and publicity throughout the Division. Applicants must have administrative and organising ability. The salary will be within Group 'D': £1,375-£1,575 per annum.

2. DIVISIONAL DISTRIBUTION ENGINEER:
Applicants should be Corporate Members of the Institution of Gas Engineers holding qualifications in gas supply and should have wide experience on the distribution side of the gas industry. The successful candidate will be responsible to the General Manager for all matters affecting the distribution of gas. The salary will be within Groups 'C/D': £1,225-£1,575 per annum.

3. DIVISIONAL PRODUCTION ENGINEER:
Applicants should be Corporate Members of the Institution of Gas Engineers holding qualifications in gas manufacture and should have experience of all aspects of gas production. The successful applicant will be responsible to the General Manager for gas manufacture throughout the Division. The salary will be within Group 'D': £1,375-£1,575 per annum.

4. DIVISIONAL PERSONNEL, WELFARE AND TRAINING OFFICER:
Applicants should have sound knowledge of personnel management and practical experience of training and welfare within industry, preferably within the gas industry. The salary will be within Grade A.P.T. 12; £900-£1,025 per annum.

The commencing salary in each case will be dependent on qualifications and experience.

The above posts are pensionable and the successful applicants will be required to pass a medical examination.

Applications stating age and giving particulars of education, training, experience and qualifications, together with the names of two referees, should be addressed to the undersigned within 14 days of the appearance of this advertisement.

A. T. HERD,
Secretary.

26, Drumsheugh Gardens,
Edinburgh, 3.

March 22, 1957.

WEST MIDLANDS GAS BOARD

WORCESTERSHIRE/HEREFORDSHIRE DIVISION
WORKS MAINTENANCE FITTER
HEREFORD DISTRICT

CANDIDATES must be conversant with maintenance requirements of boilers, steam engines, pumps and mechanical equipment.

The wage rate is 4s. 5½d. per hour (44 hour week). A cottage at a modest rent is available, on a service tenancy agreement.

Applications stating age, experience, other personal details, etc., should be addressed to the Engineer and Manager, West Midlands Gas Board, Gas Offices, Mortimer Road, Hereford, to reach him not later than April 10, 1957.

WEST MIDLANDS GAS BOARD

SHROPSHIRE DIVISION
SENIOR TECHNICAL ASSISTANT,
SHREWSBURY

APPLICATIONS are invited from suitably qualified persons for the above appointment. Salary will be within A.P.T. Grade 8 (£710-£790 p.a.) and the person appointed will be responsible to the Assistant Engineer for operational supervision and technical control of Works plant.

Applicants should have experience of Continuous Vertical Retorts C.W.G. and normal ancillary plant.

The post is pensionable and the successful candidate may be required to pass a medical examination.

If required, a flat adjacent to the Works is available at a reasonable rent on a service tenancy agreement.

Applications, stating age, qualifications and experience, together with the names of two referees, should be forwarded to Mr. W. Oldham, Divisional General Manager, West Midlands Gas Board, Sidney House, School Court, Shrewsbury, to reach him not later than Monday, April 8, 1957.

J. C. INGRAM,
Secretary to the Board.

(*Classified advertisements continued on page* 54)

APPOINTMENTS VACANT (ctd.)

EAST MIDLANDS GAS BOARD

APPOINTMENT OF SENIOR MEDICAL OFFICER

APPLICATIONS are invited from suitably qualified persons for the position of SENIOR MEDICAL OFFICER to the Board.

The person appointed will be in charge of the Board's medical services throughout the Area and will be required to reside in or near Leicester.

Applicants should possess a higher professional qualification and preferably have had experience of an industrial medical service. A brief outline of the duties and scope of the post may be obtained on application to the undersigned.

The commencing salary will be £2,500 per annum.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age, education, qualifications and experience, together with the names of two referees, should be addressed to the undersigned to be received not later than April 30, 1957.

A. GWYNNE DAVIES,
Secretary.

Beverley House,
University Road,
Leicester.

April, 1957.

EAST MIDLANDS GAS BOARD

SHEFFIELD AND ROTHERHAM DIVISION
DISTRICT MANAGER—DEARNE VALLEY DISTRICT

APPLICATIONS are invited for the above position which will become vacant during the next few months owing to the retirement of the present Manager.

The position will carry with it responsibility to the Divisional Sales and Service Manager for Sales and Consumer Service in a medium sized district.

The salary will be within Group 'B' (Senior Gas Officers) £1,105/£1,265 per annum, and the placing therein will be in accordance with the qualifications and experience of the successful candidate.

It may be possible to make a house available under a Service Tenancy Agreement.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age, education, qualifications and experience, together with the names of two referees, should be addressed to the Divisional General Manager, East Midlands Gas Board, Commercial Street, Sheffield, 1, to be received not later than April 22, 1957.

A. GWYNNE DAVIES,
Secretary.

East Midlands Gas Board,
Beverley House,
University Road,
Leicester.

March 29, 1957.

EAST MIDLANDS GAS BOARD

NOTTS. & DERBY DIVISION
DISTRICT DISTRIBUTION ENGINEER
LONG EATON/ILKESTON DISTRICT

APPLICATIONS are invited for the post of DISTRICT DISTRIBUTION ENGINEER, Long Eaton/Ilkeston District.

The District has 27,500 consumers and distributes 1,225 million cu.ft. of gas per annum.

The successful candidate will be required to control the distribution, technical and clerical staff, foremen and other employees. He will be responsible to the Divisional Distribution Engineer.

Applicants must have had practical experience of mains and service work, the design and operation of high and low pressure distribution systems and the day to day control and organisation of the department.

The commencing salary will be within Grade A.P.T. 9 (£755/£855) of the National Salary Scales.

A modern house is available at a reasonable rent.

The post is pensionable and the successful applicant will be required to pass a medical examination.

Applications giving full details of age, education, qualifications and experience, together with the names of two referees, should be addressed to reach the undersigned not later than April 16, 1957.

K. L. PEARCE,
Divisional General Manager.

East Midlands Gas Board,
Notts. & Derby Division,
P.O. Box No. 62,
Friar Gate,
Derby.

EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION
APPOINTMENT OF GROUP ENGINEER—GRIMSBY

APPLICATIONS are invited from Corporate Members of the Institution of Gas Engineers for the position of GROUP ENGINEER, Grimsby.

Grimsby Works consist of Woodall-Duckham Continuous Vertical Retorts and carburetted water gas plant with a nominal daily output of 5¼ mill. cu.ft. Candidates should have had extensive experience of the above types of plants and in the control of staff and labour.

The commencing salary will be within Group B (£1,105-£1,265 per annum) of the National Salaries Table for Senior Gas Officers, according to qualifications and experience.

The post is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age and giving particulars of education, training, experience and qualifications, together with the names of two referees, should be sent to the Divisional General Manager, Belle Vue House, Carline Road, Lincoln, to arrive not later than April 22, 1957.

Beverley House,
University Road,
Leicester.

March 27, 1957.

JUNIOR MALE ACCOUNTANT required by EAST MIDLANDS GAS BOARD (Leicester and Northants Division). The post is suitable for an advanced student interested in financial and management accounting and statistics. Applicants should be sufficiently adaptable, with training, to apply theory to practice and should also be willing to undertake necessary routine tasks as required. A modern punched card system is in course of installation.

The appointment will be made, initially, within the salary range £445-£690 per annum at a commencing salary commensurate with age and qualifications, but there will be opportunities for further progression for the right man.

The position is pensionable and the successful candidate will be required to pass a medical examination.

Applications stating age, and giving full details of education, qualifications and experience, together with the names of two referees, should be addressed to reach Divisional General Manager, E.M.G.B., Millstone Lane, Leicester, not later than April 15, 1957.

EAST MIDLANDS GAS BOARD

SHEFFIELD & ROTHERHAM DIVISION
SENIOR CHEMIST, CAR HOUSE WORKS

APPLICATIONS are invited from suitably qualified persons for the position of SENIOR CHEMIST, Car House Works, Rotherham, at a salary in accordance with Grades A.P.T. 9/10 (£755-£920) of the National Salary Scales. The initial placing on the scales will be dependent upon qualifications and experience.

Candidates should possess the Higher National Certificate in Chemistry or its equivalent and have had experience in coal carbonisation and the operation of by-product plant. The person appointed will be responsible under the Works Engineer for the supervision of the laboratory staff and the chemical control of the by-product plant.

The post is pensionable and the successful applicant will be required to pass a medical examination.

Applications, giving details of age, education, training, qualifications, etc., and giving the names and addresses of two referees, should be addressed to reach the undersigned not later than April 22, 1957.

C. C. WOOD,
Divisional General Manager.

Commercial Street,
Sheffield, 1.

March 19, 1957.

SOUTH EASTERN GAS BOARD

DRAUGHTSMAN, SPECIAL SERVICE DEPARTMENT,
709, Old Kent Road, S.E.15

APPLICANTS must be capable of making general arrangements and detailed drawings of industrial equipment. Experience in the design of gas burning appliances desirable, but not essential.

Preference will be given to applicants having the Higher National Certificate in Mechanical Engineering.

Salary within Grades 7-8 (Met. Area) £700-£820 p.a. according to qualifications and experience.

Applications in writing, quoting reference V10/788 and giving full details should reach the undersigned within seven days.

R. J. McCRAE,
Personnel Manager.

Katharine Street,
Croydon.

March 22, 1957

SOUTH EASTERN GAS BOARD

SHIFT ENGINEERS, MEDWAY DIVISION, ISLE OF GRAIN WORKS

FOUR SHIFT ENGINEERS are required for this new Works, and applicants should preferably be Corporate Members of the Institution of Gas Engineers or of equivalent status. A basic knowledge of the physical sciences and practical experience in the control of processes on gas or chemical works are necessary.

Successful applicants will be given opportunity to train in the special features of the process to be operated at the Isle of Grain.

The salary will be within Grades 11 or 12 (Prov. 'A')—£850-£1,025 p.a.—according to qualifications and experience.

Housing accommodation will be available at a reasonable figure for the successful applicants.

Applications, quoting reference V10/689, should reach the undersigned within seven days.

R. J. McCRAE,
Personnel Manager.

Katharine Street,
Croydon.

SOUTH EASTERN GAS BOARD

SENIOR INSTRUCTORS FOR DIVISIONAL TRAINING CENTRES

THERE are vacancies for two SENIOR INSTRUCTORS, one in the West Surrey Divisional Centre at Mitcham and the other in the Sussex Divisional Centre at Hove.

These Instructors are required to give technical instruction and refresher training to district representatives, showroom and other staff, and should have as a minimum qualification either "City and Guilds" Certificate in the Technology of Gas Supply or the Institution of Gas Engineers' Certificate in Gas Salesmanship and Consumer Service.

Applicants should have some experience in lecturing and demonstration work.

Salaries within Grades 7 or 8 according to qualifications and experience. Mitcham training centre (Met. Area) £700-£820. Hove training centre (Prov. 'A') £670-£790.

Applications in writing quoting reference V10/789 should reach the undersigned within seven days, and should state whether applicant wishes to be considered for one or both vacancies.

R. J. McCRAE,
Personnel Manager.

Katharine Street,
Croydon.

BRITISH ENGINE BOILER AND ELECTRICAL INSURANCE CO. LTD.,

24, FENNEL STREET, MANCHESTER, 4

GASHOLDER Inspection. An ASSISTANT ENGINEER required for the Gasholder Department at the Company's Head Office in Manchester. Permanent position; progressive salary with non-contributory pension. Candidates must have had a good general education and have served an apprenticeship with a reputable firm of Gasholder Manufacturers, and have had site erection and drawing office experience. Applicants should state age and give full particulars of training and experience.

PATENTS

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PLANT FOR SALE

SPECIAL OFFER: Large quantity of new cast iron fullway valves, all iron parts, 8 in., 10 in., 12 in. and 14 in. for sale. The Midland Iron & Hardware Co. (Cradley Heath) Ltd., Cradley Heath, Staffs. Tel.: Cradley Heath 6264 and 5.

FOR SALE.—Unused Walworth Lubricated Valve at ordinary Gland Cock prices. 2 in. and 3 in. screwed, 3 in. and 4 in. flanged. Cleckheaton Engineering Co. Ltd., Cleckheaton, Yorks. Phone 397.

Total Installed capacity of B.M. Meters

1,000 Million cu.ft. per day

The total installed capacity of B.M. Industrial Consumers' Meters throughout the U.K. is in excess of 1,000 million cu. ft. per day.

This meter, which is approved by the Ministry of Fuel & Power for the sale of gas, can be relied on to give consistent accuracy over long periods with a minimum of maintenance.

It is suitable for the measurement of either purified or unpurified gas at pressures up to approximately 2 lbs. per sq. inch. High pressure meters are also available.

For full details please write for Publication No. 51/5

W. C. HOLMES & CO. LTD

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All Sizes up to 24 in. Flanged, Plain ends, Screwed and Socketed, Loose Flanged, Victaulic and Unicone Joints.

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CRADLEY HEATH, STAFFS.

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LARGEST MANUFACTURERS OF GAS MAIN BAGS.
Telegrams—"AIRPROOF, BARB, LONDON." Telephone—6147 CLERKENWELL

Gas Bags for Repairing Mains

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PATENTEES OF THE
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Impervious to Main Liquor and Climatic Influences.

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DRAIN RODS AND WHALE-BONE BRUSHES.

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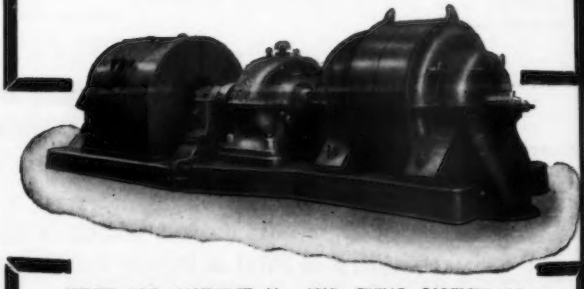

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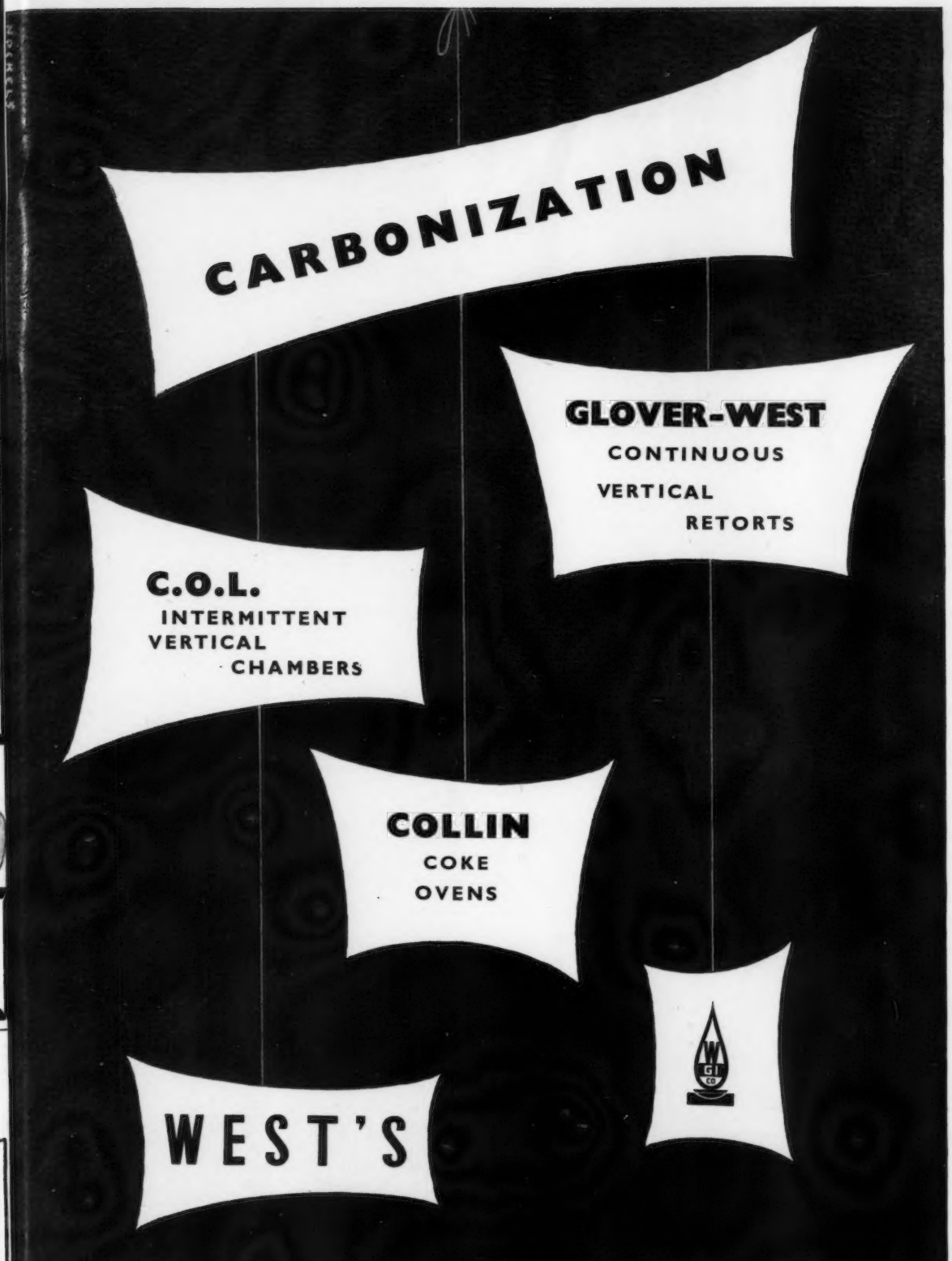

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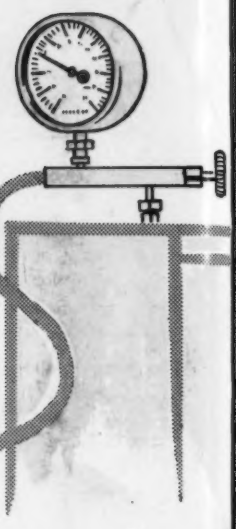
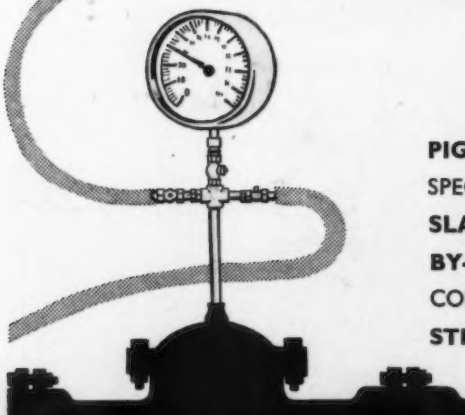


Only top-quality pipes and joints are suited to the sustained conveyance of gas at high pressure. Today very many miles of Stanton Spun Iron Pipes and Flexible Joints are faithfully fulfilling this important task.

The hydraulic proof testing of each pipe—to a pressure of 500 lb. per square inch—is only one of the many controls carried out before despatch to ensure that Stanton Spun Iron Pipes, together with Screwed-Gland and Bolted-Gland Flexible Joints, are well able to satisfy the most exacting requirements.

The following schedule shows the installation air-test pressures and gas working pressures to which Stanton Flexibly Jointed mains can be subjected:

DIAMETER OF MAIN	MAXIMUM AIR TEST PRESSURE	MAXIMUM GAS WORKING PRESSURE
Up to 6 in. ..	100 lb. per sq. inch	80 lb. per sq. inch
7 in. to 10 in. ..	75 lb. per sq. inch	60 lb. per sq. inch
12 in. to 24 in. ..	60 lb. per sq. inch	50 lb. per sq. inch
27 in.	40 lb. per sq. inch	30 lb. per sq. inch



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